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OPEN INTRACARDIAC REPAIR OF ATRIAL AND VENTRICULAR SEPTAL DEFECTS WITH THE AID OF EXTRACORPOREAL CIRCULATION

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Surgical procedures within the chambers of the heart have been made possible by the development of mechanical heart-lung systems. Gibbon [4] pioneered in the field of extracorporeal circulation, and successful application of intracardiac surgery using the heart-lung apparatuses were reported by Gibbon [4] and Dodrill [3]. The epochal reports of Lillehei and associates [6,7] and of Kirklin and co-workers [5] demonstrated conclusively that mechanical extracorporeal circuits could be used effectively for intracardiac surgical procedures.

Since August 1956, 24 patients on the Tulane Surgical Service at Charity Hospital and Touro Infirmary have been operated upon with the aid of a heart-lung apparatus (Figure 1). Among these patients were 14 with atrial septal defects, 7 with ventricular septal defects, 2 with pulmonary stenosis and atrial septal defects, and 1 with aortic insufficiency. This report is concerned with a review of the pertinent features of atrial and ventricular septal defects and an analysis of our experience with these anomalies in 23 cases.

PATHOLOGY

Among atrial defects the foramen secundum type occurs most commonly, and such defects are due to failure of the septum secundum to cover completely the developmental opening in the septum primum. These defects are usually high and posterior in the septum, vary considerably in size, and at times may be cribriform.

A persistent ostium primum is a result of failure of fusion between the septum primum and the endocardial cushions. Such defects lie just above the atrioventricular ring. The endocardial cushions are involved in the formation of the atrioventricular valves and the ventricular septum, and abnormalities of these valves and the membranous ventricular septum are not uncommon in association with a persistent ostium primum. Thus, this defect may occur alone, in combination with clefts in the A-V valves (partial atrioventricular canal), or it may be associated with abnormalities of the A-V valves and a defect of the membranous ventricular septum (complete atrioventricular canal).

Abnormalities of pulmonary venous drainage are occasionally associated with atrial septal defects. The pulmonary veins arise

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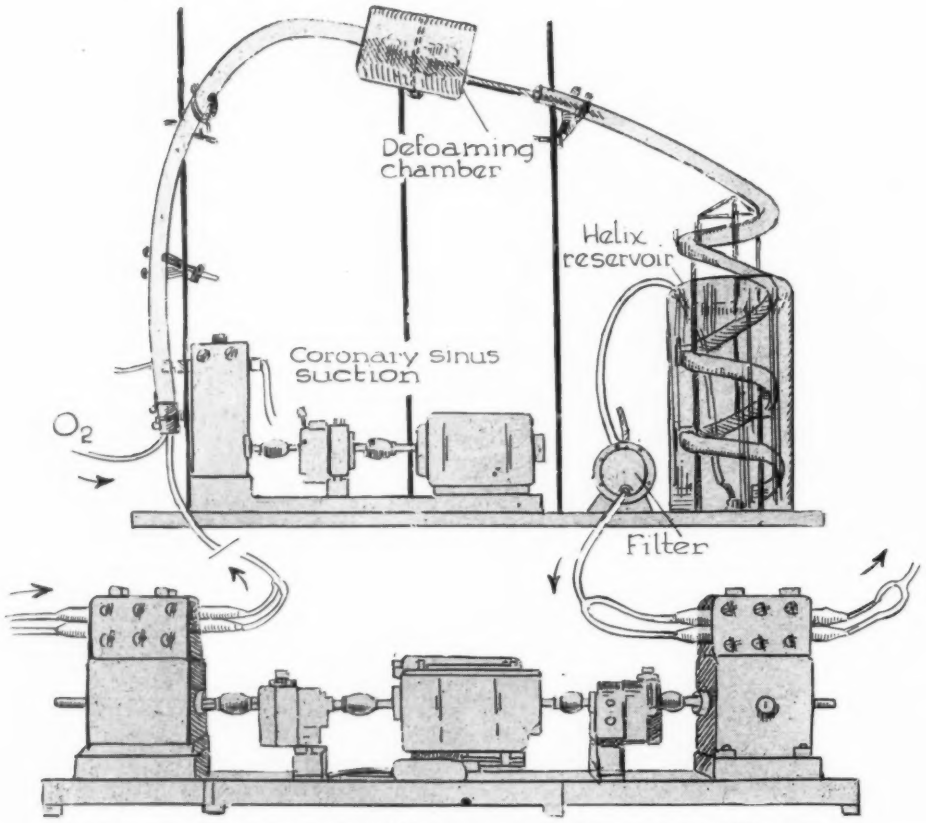

Figure 1.—Diagram of a bubble-oxygenator system of the DeWall type.

from a primary venous plexus which drains the lung buds. The common pulmonary vein eventually becomes incorporated into the posterior left atrial wall. As a result of this developmental feature a variety of abnormalities of pulmonary venous drainage may occur. If all the veins insert to the right of the septum secundum, the pulmonary venous blood will drain into the right atrium, a situation which constitutes total anomalous venous return. Partial anomalous venous return occurs when one or more of the pulmonary veins enters the vena cavae or other systemic veins.

Ventricular septal defects occur in a variety of locations and are not always closely correlated with embryologic development. Defects of the muscular septum are usually ventrally placed and may occur in the right ventricular outflow tract or toward the apex. A majority of ventricular septal defects, however, occur in the area of the membranous septum as a result of failure of the endocardial cushions or the bulbar ridges to develop. These defects occur high beneath the septal leaflet of the tricuspid valve and are usually oval in shape, with the long axis approximately parallel to the atrioventricular rings. Often the superior portion of the defect encroaches upon the aortic ring, and occasionally the aortic cusps may project below the upper margin of the defect, thereby constituting a hazard during repair.

For reasons that are not entirely clear, changes may develop eventually in the pulmonary arterioles as a result of the physiologic alterations produced by atrial and ventricular septal defects. Intimal proliferation and medial hypertrophy produce an increase in resistance to flow in the pulmonary circuit. As resistance to flow in-

creases, pulmonary artery pressure also increases and may reach such levels that a right-to-left shunt develops. The size and duration of the intracardiac shunt through a septal defect, the level of pulmonary artery pressure, the extent to which the fetal pulmonary arteriolar pattern persists, and the development of repeated small pulmonary emboli have all been incriminated as factors contributing to the development of pulmonary hypertension. In the case of ventricular septal defects, a rise in right ventricular pressure to a level approximating the left ventricular systolic pressure results in a right-to-left shunt and arterial unsaturation. This condition is known as the Eisenmenger complex.

In atrial septal defects the shunt is from left-to-right because the left atrial pressure is normally about twice as great as the right atrial pressure. As pulmonary arteriolar resistance increases, right ventricular pressures are elevated and tricuspid regurgitation may ensue. Eventually the right atrial pressure equals and exceeds the left atrial pressure, and reversal of flow with arterial unsaturation results. In general, patients with a persistent ostium primum develop pulmonary vascular changes and a right-to-left shunt earlier than patients with secundum defects.

CLINICAL MANIFESTATIONS

The clinical course in patients with atrial septal defects may vary considerably. Often there is a history of a heart murmur in an otherwise healthy individual. These patients are usually poorly developed but rarely cyanotic.

Infrequently, a child with an atrial septal defect will develop pulmonary hypertension early, with heart failure and cyanosis. As a rule, however, progression of the arteriolar changes is slow and symptoms are insidious in onset. Most patients develop symptoms by the age of 20, and the most common symptom is incapacity on exertion. From this age on, pulmonary arteriolar resistance increases and symptoms progress more rapidly. Paroxysmal tachycardia, dyspnea on exertion, and pneumonitis become frequent. As pulmonary hypertension increases a right-to-left shunt develops only during exercise or during bouts of paroxysmal tachycardia. Later the reversed shunt persists and pulmonary emboli are not uncommon.

The murmur of atrial septal defect is usually holosystolic, moderately loud and blowing. It is heard best in the second or third intercoastal space along the left sternal border. The pulmonary second sound is accentuated and usually widely split. In addition, there may be a high pitched, early diastolic murmur at the pulmonary area or along the left sternal border, produced by pulmonic insufficiency. A low pitched middiastolic rumble, heard laterally toward the apex is usually due to relative tricuspid stenosis. The syndrome of Lutembacher, consisting of true mitral stenosis and an atrial septal defect, is rare in our experience, although thickening of the mitral leaflets is not uncommon. The murmur of mitral insufficiency strongly suggests the presence of a persistent ostium primum.

The electrocardiogram usually shows either right bundle branch delay or block, or right ventricular hypertrophy. Frequently, the two cannot be distinguished, and indeed, both may be present. In patients with persistent ostium primum there is an associated left axis deviation, and there may be electrocardiographic evidence of left ventricular hypertrophy. Varying degrees of atrioventricular block, atrial flutter, and fibrillation may be present. Roentgenographically, there is moderate to marked cardiac enlargement, although generally poor correlation exists between heart size and the degree of shunt in children and young adults. Later, as heart failure develops from increasing pulmonary hypertension, cardiac enlargement increases. The pulmonary conus is prominent in the presence of atrial septal defect, and pulsation in the pulmonary vessels is evident. The right atrium and ventricle are large, whereas the left atrium, left ventricle and aorta are small. In the left anterior oblique projection a large right ventricle may displace the left ventricle posteriorly, producing the impression of enlargement of both ventricular chambers. Occasionally, widening of the superior mediastinum is a clue to the

presence of anomalous pulmonary venous drainage.

The clinical findings in ventricular septal defects show more variation than those of atrial septal defects. Thus, patients with relatively small defects (Roger's disease) usually have a loud, harsh, rasping holosystolic murmur along the lower left sternal border, with mild to moderate accentuation of the pulmonary second sound. This sound is almost always split. Such patients are usually asymptomatic and show only slight to moderate cardiac enlargement. Aside from the danger of bacterial endocarditis, patients with small, isolated ventricular septal defects may suffer no ill effects of the anomaly. Frequently, however, children with large ventricular septal defects develop symptoms early in life. Their growth is retarded, they develop pulmonary hypertension early and suffer from symptoms of heart failure. On examination a precordial bulge is evident. There is a loud, harsh systolic murmur along the left sternal border with an accentuated pulmonary second sound which is split and frequently associated with a high-pitched diastolic murmur. As with atrial septal defects, when the pressure of the two ventricles approximates one another, reversal of flow and cyanosis ensue.

The electrocardiogram in the patient with a small, asymptomatic ventricular septal defect is usually normal, although a slight degree of left ventricular hypertrophy may be observed. In patients with larger defects there is obvious left ventricular hypertrophy and with still larger defects there may be combined right and left ventricular hypertrophy. In the presence of pulmonary hypertension and reversal of flow, right ventricular hypertrophy becomes predominant. Varying degrees of atrioventricular block may be present.

Roentgenographically, there is good correlation between heart size and size of the shunt. Thus, with the small ventricular septal defect heart size is usually normal; whereas in the larger defects, the heart shows moderate or marked enlargement. The pulmonary conus is prominent, and the pulmonary vasculature is increased. Slight left atrial enlargement is often noted on barium swallow.

CARDIAC CATHETERIZATION

The diagnosis of atrial and ventricular septal defects can be established by cardiac catheterization (Table 1). Frequently, the catheter can be passed through an atrial septal defect into the left atrium. Considerable care should be exercised in "exploring" the right border of the right atrium for anomalous pulmonary veins. Although it is difficult to be certain that the cathe-

TABLE 1
FINDINGS IN CARDIAC CATHETERIZATION IN TYPICAL CASES OF VENTRICULAR AND ATRIAL SEPTAL DEFECTS

Source	Ventricular Septal Defect		Atrial Septal Defect			
			Primum		Secundum	
	O_2 vol. %	Pressure mm Hg	O_2 vol. %	Pressure mm Hg	O_2 vol. %	Pressure mm Hg
P.A.	16.28	48/18	17.9	32/16	14.9	30/10
R.V.	High 16.5 Mid. 17.5 Low 16.5	Rest 48-64/10 Exer. 94/8	17.9	Rest 32/9 Exer. 44-58/10	14.9	58/15
R.A.	14.0	7.2	High 15.7 Mid. 16.3 Low 17.9	10	High 14.3 Mid. 14.6 Low 14.8	15
S.V.C.	14.1	7.2	13.8	10	11.5	15
Left to Right Shunt	App. Equal to Systemic Venous Return		App. 5 Times Systemic Venous Return		2-3.3 Times Systemic Blood Flow	

ter did not first pass through the septal defect, the correct diagnosis usually can be suspected. Particular attention should be given to the superior caval and left innominate vein region where anomalous left pulmonary veins commonly enter. Indications of their presence may be obtained by comparing the superior vena caval blood with arterial samples at the time of withdrawal. The diagnosis and location of this type of anomalous pulmonary venous drainage is not difficult and is of considerable importance to the surgeon. Anomalous drainage into the inferior vena cava is less common but can be similarly detected.

The diagnosis of persistent ostium primum can be confirmed at catheterization. With manipulation the catheter, nearing the tricuspid valve, will pass obliquely into the left ventricle with a characteristic configuration. By carefully observing the pressure tracing as the catheter is withdrawn, and comparing ventricular, arterial and atrial blood samples, one can demonstrate that the catheter has passed from the right atrium directly into the left ventricle. Left atrial pressure tracings may indicate the presence of considerable mitral regurgitation.

Demonstration of ventricular septal defects by catheterization may be difficult. The presence of a large, patent ductus arteriosus with pulmonary hypertension and pulmonary insufficiency may present data similar to those of a large, high ventricular septal defect. Frequently, however, the catheter can be manipulated into the aorta. Careful withdrawal of the catheter, to demonstrate that the route was from the right ventricle into the pulmonary artery and then into the aorta is necessary to establish the presence of a patent ductus under these circumstances. Should the catheter pass from the right ventricle to the aorta without traversing the pulmonary artery as evidenced by pressure tracings, the diagnosis of ventricular septal defect is established. Generally, when the two are associated, most or all of the ventricular blood samples reveal an increase in oxygen content over that of the right atrium. With pulmonary regurgitation and patent ductus arteriosus only the sample obtained immediately on the ventricular side of the pulmonary valve shows an increase in oxygen content over the other right ventricular samples.

Frequently, in ventricular septal defects and to a lesser extent in atrial defects, an intermediate pressure zone is found between the pulmonary artery and right ventricular outflow tract. This zone has a systolic pressure equal to the pulmonic, and a diastolic pressure equal to that in the right ventricle. The systolic, pulmonary artery-to-right ventricle gradient may be as much as 50 to 90 mm/Hg. Indeed, we have seen this gradient increase significantly within one to four years. At operation, with the heart temporarily arrested, an infundibular zone may not be encountered although there may be slight hypertrophy of the crista supraventricularis. This suggests that the hypertrophy is producing physiologic derangement which is not evident anatomically in the arrested atonic heart. During systole, this muscular band contracts over the outflow tract producing stenosis and a systolic gradient within the outflow tract, but relaxes during diastole leaving a uniform diastolic pressure. Experience has indicated that this hypertrophy does not require surgical correction, but regresses spontaneously if the ventricular defect is properly repaired.

OPERATIVE TECHNIQUES

After adequate preanesthetic medication, anesthesia is induced with intravenous barbiturate and succinyl choline or, in the case of small children, cyclopropane and ether. There are two factors associated with open heart operations which influence the types of anesthetic agents employed. The first of these is the use of electronic instruments in the operating room, none of which is explosion-proof. Therefore, after an endotracheal tube has been passed a nonexplosive agent must be used. The second factor is the escape of anesthetic gases from the blood as it passes through the oxygenator. Thus, in order to keep the patient anesthetized and immobile during perfusion, it is necessary to employ a nonvolatile agent.

For repair of atrial and ventricular septal defects the patient is placed in a supine

position with a small sand bag under the right shoulder and hip (Figures 2 and 3a). A curved, submammary incision is made on the right and extended across the sternum at the level of the fourth intercostal space. The right pleural cavity is entered through

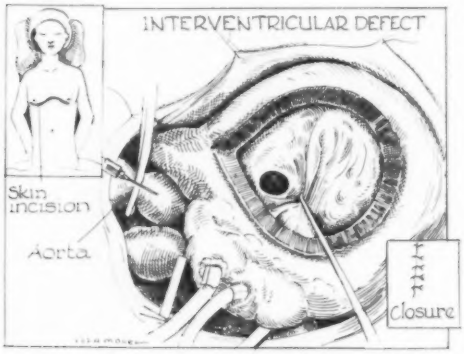

Figure 2.—Inset shows position and skin incision for repair of ventricular septal defect. Diagram shows ventricular septal defect as viewed through a right ventriculotomy. The septal leaflet of the tricuspid valve is retracted to demonstrate the defect.

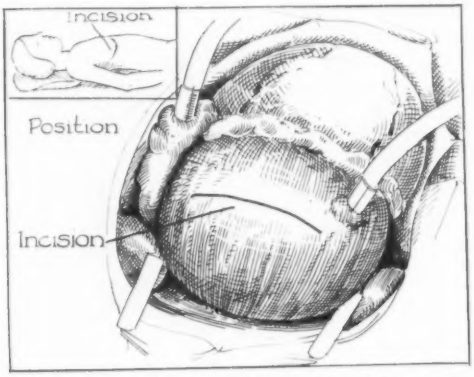

Figure 3a.—Diagrams showing position of skin incision and right atriotomy in case of atrial septal defect. Catheters are shown in the superior and inferior vena cavae.

the fourth intercostal space and after ligation and division of the right and left internal mammary arteries the sternum is transected. This incision is adequate for repair of atrial septal defects (Figure 3a), but for repair of ventricular septal defects it is necessary to extend the incision in the fourth intercostal space to the left anterior axillary line (Figure 2).

The pericardium is opened widely to expose the right atrial appendage, right lateral wall of the right atrium and the anterior surface of the right ventricle. A purse-string suture is passed about the base of the atrial appendage and after applying a noncrushing clamp the appendage is opened. Digital exploration is performed and a systematic examination is made of the superior and inferior vena caval orifices, the atrial septum, the coronary sinus, and the tricuspid valve. If an atrial septal defect is present its size and location are determined; then the exploring finger is passed through the defect into the left atrium, and the mitral valve is digitally examined. The finger is then passed through the tricuspid valve and the ventricular septum explored for the presence of defects. Finally the right ventricular outflow tract is palpated. Upon completion of exploration the finger is withdrawn and the occluding clamp reapplied.

When the diagnosis has been confirmed preparations are made for attaching the patient to the heart-lung apparatus. Heparin is administered intravenously in a dose of 3 mg./kg. body weight. The vena cavae are isolated at their juncture with the right atrium and tapes are passed about them. Both common femoral arteries are exposed through oblique incisions in the groin and cannulated for arterial return from the pump-oxygenator and for continuous measurement of arterial blood pressure. The tip of the right atrial appendage is excised and large plastic catheters are inserted through the appendage into the superior and inferior vena cavae (Figure 3a). Blood from the helix-reservoir passes through a stainless steel filter, through the arterial side of the pump, and is returned to the patient via the femoral artery. When the cannulas are properly placed and the extracorporeal circuit is primed with fresh, heparinized blood, perfusion is begun. The tapes about the cavae are then tightened to produce complete cardiac inflow occlusion. The atrium or ventricle is opened between traction sutures of silk.

In the case of atrial septal defects, the right atrium is opened parallel to the vena cava (Figure 3a). A specially designed

sucker is inserted into the atrium and is kept in the region of the coronary sinus to maintain a relatively bloodless field during operation. This blood is returned to the oxygenator. The atrial septal defect is identified and repair accomplished. Upon completion of closure of the defect the atrio-

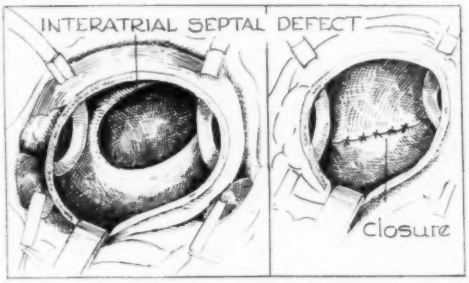

Figure 3b.—Diagrams showing location of the atrial septal defect and the method of closure.

tomy is closed partially, the caval tapes are released so that the right atrium fills with blood and a non-crushing clamp is then applied to the unclosed portion of the atrial wound. In this way closure of the atrium can be completed as perfusion is gradually discontinued.

In cases of ventricular septal defects, temporary cardiac arrest is desirable in order to define and repair the defect. For this purpose 25 per cent potassium citrate is used; 8 cc. of this agent is diluted in 42 cc. of oxygenated blood. An occluding clamp is placed upon the ascending aorta about 3 cm. above the coronary arteries, and the potassium solution is rapidly injected proximal to the occluding clamp. Complete cardiac arrest takes place within thirty to sixty seconds. When the heart is stopped the right ventricle is opened to the right of and parallel to the interventricular septum, the incision extending into the ventricular outflow tract. With the right ventricle opened widely, the defect is identified and closure accomplished either by direct suture or by use of an Ivalon patch. The occluding clamp is then removed from the aorta, thus perfusing the coronary arteries and washing out the potassium citrate solution remaining in the myocardium. Cardiac action usually begins promptly. With the right ventricle filled with blood the ventricular wound is closed with two continuous sutures of silk.

When the cardiotomy is closed and the heart is beating vigorously protamine sulfate is administered in a dose equivalent to that of heparin given at the beginning of operation. The catheters are removed from the cavae and from the femoral arteries and the arterial wounds are repaired.

ANALYSIS OF CASES

There were 16 patients with defects of the atrial septum. In 6 of the cases the atrial septal defect was central and ranged from 3 to 6 cm. in diameter. There were 5 instances of posterior defects with pseudo-anomalous pulmonary venous drainage. In all these cases the defects were large and in most instances constituted a single atrium. In 2 cases an atrial septal defect was associated with true anomolous pulmonary venous drainage. In one of these the pulmonary veins entered the right lateral wall of the right atrium and there was a large posterior defect. In the other case, a central septal defect was associated with drainage of the right pulmonary veins into the superior vena cava and right atrium. There were 3 instances of persistent ostium primum. Two were associated with clefts in the septal leaflets of the mitral and tricuspid valves and the third was associated with complete atrioventricular canal. An additional two patients had atrial septal defects and pulmonic valvular stenosis. All of these patients underwent cardiac catheterization prior to operation and in each instance the diagnosis was correctly established. That is, the presence of an atrial septal defect was determined, and the presence of additional malformations such as anomalous pulmonary venous drainage, and persistent ostium primum or pulmonic stenosis were likewise established.

Among the 7 ventricular septal defects 1 was acquired as a result of a stab wound of the heart and 6 were congenital in origin. There were two defects in the right ventricular outflow tract, one of which was low in the muscular portion of the septum and 4 were defects in the membranous septum. Of the defects in the right ventricular outflow tract, one was just distal to an hy-

pertrophied crista supraventricularis. One of the patients with a defect of the membranous septum had undergone operation for closure of a patent ductus arteriosus two years previously. The remaining 5 ventricular septal defects were unassociated with other cardiac anomalies.

The duration of cardiac-pulmonary bypass varied from ten to thirty-five minutes, with an average of fifteen minutes for the 21 cases. The length of time the heart was opened, in the case of atrial septal defects, or was temporarily arrested, in the case of ventricular septal defects, or was temporarily arrested, in the case of ventricular septal defects, varied from eight to thirty-three minutes with an average of thirteen minutes.

The rate of perfusion varied considerably, but in every instance an attempt was made to establish extracorporeal circulation at the level of maximal venous return. That is, the speed of the pump was gradually increased until the cavae were being adequately emptied. Perfusion was maintained at this rate by the addition of blood administered intravenously. In effect, this technic resulted in maintenance of an apparently normal central venous pressure, although this pressure was not actually measured. Furthermore, an attempt was made to maintain a central arterial blood pressure above 50 to 60 mm. of mercury systolic. In no instance was the pump set at a predetermined rate on the basis of body weight or other factors.

RESULTS

Among the 24 patients operated upon there were 2 deaths in the early postoperative period. (Table 2). One of the deaths followed repair of a large atrial septal defect in a 37 year old woman who had pulmonary hypertension and had been operated upon two months previously, at which time repair of the defect by the Sondergaard technic was abandoned. This patient reacted from anesthesia, but with obvious central nervous system damage. During the next four days her condition steadily deteriorated, with the development of generalized convulsions, hyperthermia, and death. At necropsy the atrial septal defect was adequately repaired and there were no abnormalties noted in the brain to account for the symptoms occurring after operation and terminating in death. The other fatality occurred following repair of a ventricular septal defect in a 17 year old boy. This patient had a corrected transposition with a large defect in the membranous ventricular septum which was easily repaired during temporary cardiac arrest. His condition immediately after operation appeared good, but twelve hours later he died suddenly. Complete heart block had been present prior to operation and persisted after operation, and it was the consensus that death had been due to some additional disturbance in cardiac conduction. Permission for a partial necropsy was granted and at this examination the operative findings were confirmed. In addition, the left ventricular chamber was severely deformed and consisted essentially of two chambers, one of which communicated with the left atrium through a severely deformed mitral valve. This chamber in turn communicated with a second left ventricular cavity which emptied through the ventricular septal defect into the pulmonary artery, the latter being abnormally placed because of the transposition anomaly. In reality, these anomalies were incorrectable by present technics.

TABLE 2
OVERALL RESULTS IN THE SERIES OF PATIENTS WITH INTRACARDIAC DEFECTS TREATED BY DIRECT REPAIR WITH THE AID OF EXTRACORPOREAL CIRCULATION

Abnormality	Number of Cases	Survivals
Atrial septal defect:		
Secundum	11	10
Primum	3	3
With pulmonary stenosis	2	2
Ventricular septal defect	7	6
Aortic insufficiency	1	1
Total	24	22

Complications followng operation were mainly pulmonary, consisting of patchy atelectasis, fever and cough lasting three or four days. The symptoms gradually subsided, the patients becoming afebrile about the seventh day. Because of the frequency

with which this complication was encountered, patient No. 15 was given aqueous penicillin intravenously in a dose of 20 million units per day for three days. The subsidence of fever and other symptoms was so gratifying that this measure was instituted for all subsequent cases. From this small experience, it appears that the administration of large doses of penicillin intravenously during the early period after operation significantly reduces the severity, if not the incidence, of pulmonary complications. The second complication encountered was central nervous system disturbances, similar to that noted in one of the patients who succumbed. These disturbances occurred in 2 patients, and consisted of decerebrate rigidity in one lasting about three weeks and ending in complete recovery of the patient, and mild cerebral irritability in the other. In the latter there were no gross neurologic disturbances but the patient appeared less alert and was poorly orientated. These symptoms disappeared within four or five days after operation. The etiology of these central nervous system symptoms is not entirely clear. Gas or fibrin emboli, temporary cerebral anoxia and metabolic abnormalities have been suggested.

There was one late death occurring four months after closure of a ventricular septal defect. This patient had complete heart block prior to operation, which persisted after operation. His death occurred suddenly while at work and an autopsy was not obtained.

The remaining 21 patients are living and clinically well. It is planned to recatheterize all of these patients within the next year in order to determine the completeness of repair of the septal defects and the extent to which cardiac hemodynamics have been altered by operation.

CASE REPORTS

The following cases illustrate the types of atrial and ventricular defects encountered, their clinical manifestations, data obtained at cardiac catheterization, and the technics employed for repair:

B. J. D., an asymptomatic 9 year old white boy was known to have a cardiac murmur since age 6 months. He had no symptoms referable to a cardiac lesion, however, and growth and development had been normal.

Examination revealed a friendly, strong-looking boy of somewhat slight configuration. Pertinent findings were confined to the thorax where a grade II systolic murmur was heard to the left of the sternum in the third intercostal space. The pulmonary second sound was split. The heart was not grossly enlarged.

Chest roentgenograms showed a prominent pulmonary artery, right atrial and right ventricular enlargement and increased vascularity of the lungs. A large atrial septal defect with pulmonary blood flow three times systemic flow was demonstrated by cardiac catheterization (Table 3). Right ventricular pressure rose to 44 mm. Hg. with exercise. The electrocardiogram was within normal limits.

On August 2, 1957, operation was performed at Touro Infirmary with the aid of extracorporeal circulation. A defect in the atrial septum 5.0 cm. in diameter (secundum type) was closed with two continuous silk sutures. (Fig. 3a & b). His course after operation was uneventful.

B. B., a 14 year old girl had experienced ex-

TABLE 3
TABULATION OF DATA FROM CARDIAC CATHETERIZATION IN FOUR REPRESENTATIVE CASES. CLINICAL HISTORIES OF THESE PATIENTS APPEAR UNDER "CASE REPORTS"

Defect	A.D. Ventricular		A.H. Ventricular		B.J.D. Atrial		B.B. Atrial	
Source	O_2 vol. %	Pressure mm Hg	O_2 vol. %	Pressure mm Hg	O_2 vol. %	Pressure mm Hg	O_2 vol. %	Pressure mm Hg
P.A.	14.5	72/27	9.5	35/12	14.6	28/16	14.3	40/20
R.V.	13.8	72/4-8	9.6	44/12	14.9	30/8	14.6	44/14
R.A.	10.3	7/4	7.3	12	15.6	8	14.6	10
S.V.C.	10.2		6.6		10.3		9.5	
Left to Right Shunt Volume	Not Calculated		Not Determined		4 x Systemic Flow		2.3 - 4.4 x Systemic Flow	

ertional dyspnea throughout childhood. When she was 9 years old a diagnosis of congenital heart disease was made on the basis of a murmur and recurrent episodes of dyspnea. One year before admission she had a single episode of paroxysmal nocturnal dyspnea. Since then she had also noted recurrent pedal edema. Treatment with digitalis was initiated then and continued up to the time of admission. There was a history of chronic otitis media since early childhood.

Examination disclosed a normally developed, slightly obese 14 year old girl in no distress. Significant physical findings consisted of bilateral, chronic, otitis media with perforations of the tympanic membranes and abnormal heart sounds. The pulmonary second sound was loud but not split. A grade II systolic murmur was heard best along the left sternal border in the 3rd and 4th intercostal spaces. The heart was not enlarged.

Roentgenograms of the chest showed only some fullness in the region of the pulmonary artery. The electrocardiogram suggested right ventricular hypertrophy. Cardiac catheterization established the diagnosis of anomalous drainage of the veins of the right lung, an atrial septal defect, and hypertension in the right ventricle on exercise. (Table 3).

At operation on August 19, 1957, a centrally placed ostium secundum was identified. (Fig. 4).

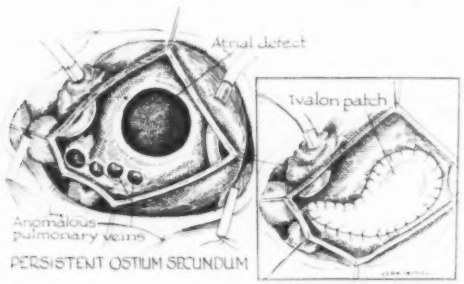

Figure 4.—Diagram of case with atrial septal defect and anomalous insertion of the pulmonary veins into the right atrium. An ivalon patch was sutured over the defect and to the right of the pulmonary veins, thereby diverting pulmonary venous flow into the left atrium.

In addition all the veins from the right lung entered the right atrium. One of these veins entered the superior vena cava. A patch of polyvinyl sponge was sutured to the margins of the septal defect and to the atrial septum so that venous drainage from the right lung was shunted through the defect into the left atrium.

Her course after operation was uneventful and she was discharged on the nineteenth day.

A. H., a 13 year old white girl was admitted from Lallie Kemp Charity Hospital on July 30, 1957. She had been known to have "heart trouble" since birth. During early childhood she developed numerous respiratory infections. While attending school dyspnea developed when she attempted to keep up with her schoolmates in sports. If she persisted beyond the appearance of dyspnea, she would feel "tired" and mildly dyspneic for two to three days thereafter.

Examination revealed normal growth and development. Aside from extensive dental caries and infection abnormal physical signs were confined to the thorax. A powerful systolic thrill was felt over the precardium and there was a very loud, harsh systolic murmur heard best along the left sternal border. This murmur could also be heard in the neck and over the left hemithorax posteriorly. The pulmonary second sound was loud and split.

Roentgenographic examination revealed right and left ventricular enlargement, prominence of the pulmonary artery and engorged pulmonary vasculature. The electrocardiogram was compatible with left ventricular hypertrophy and there was left axis deviation.

Cardiac catheterization, performed on August 9, 1957, was not entirely satisfactory because of a moderate anemia. A definite left-to-right shunt probably at both the atrial and ventricular levels was demonstrated as well as moderate pulmonary hypertension (Table 3). Catheterization data suggested a persistent ostium primum and the electrocardiographic evidence of left ventricular hypertrophy indicated incompetence of the mitral valve.

On August 15, 1957, operation was performed with the aid of extracorporeal circulation. A persistent ostium primum and clefts in the anterior leaflets of the mitral and septal leaflet of the tricusped valves were found. (Fig. 5). The cleft

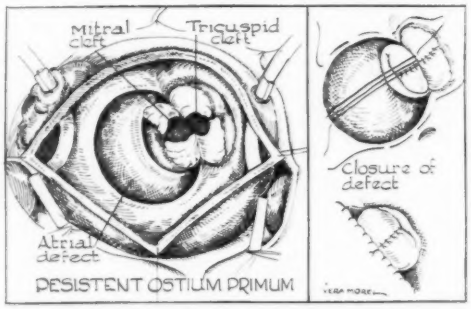

Figure 5.—Diagram showing the findings in a case of persistent ostium primum and atrioventricular canal. Clefts in the leaflets of the mitral and tricuspid valves were sutured, and the inferior edge of the atrial septum was sutured to the superior margin of the ventricular septum.

valves were repaired with three interrupted sutures and the atrial defect was then closed by direct coaptation of the edge of the defect above to the membranous interventricular septum below. The procedure was well tolerated.

The temperature rose to 105 degrees F. on the day of the operation and was ascribed to pneu-

monia involving the left lower lobe. The patient exhibited delirium and inappropriate behavior during this febrile episode. Large amounts of penicillin were infused intravenously (20 million units daily) and on August 18, 1957, bronchoscopy was carried out. This revealed no segmental or lobar bronchial obstruction. On August 23, 1957, she had a convulsion lasting five minutes. With return of temperature to normal levels her behavioral aberrations ceased and signs of pulmonary consolidation rapidly subsided. By the time of discharge from the hospital on September 6, 1957, she was asymptomatic.

A. D., a 9 year old girl from Monroe, Louisiana, had a history of significant cardiac disability from birth. When one year old she was found by her family doctor to have an enlarged heart and retarded growth. Cardiac catheterization at Charity Hospital, in 1953, disclosed a patent ductus arteriosus and ventricular septal defect. Secondary pulmonary hypertension and pulmonary regurgitation were also present. At this time the patient was in congestive heart failure. The ductus arteriosus was closed in April 1953, with improvement in her growth rate and cardiac status. In August 1956, she was again catheterized and was demonstrated to have ventricular septal defect with pulmonary hypertension (Table 3).

On examination at her present admission she was small for her age and weighed 42 pounds The right ventricle was enlarged and hyperactive as evidenced by precordial heaving. A systolic murmur was heard along the left sternal border. The only significant laboratory findings were roentgenographic evidence of cardiac enlargement (right and left ventricles) and plethoric lung fields. The electrocardiogram showed right and left ventricular hypertrophy.

On October 25, 1957, a defect in the ventricular septum was closed under direct vision with the aid of extracorporeal circulation and temporary cardiac arrest induced with potassium citrate. The defect measured 2.0 cm. in diameter and was located high in the membranous septum (Fig. 2).

Postoperatively incomplete heart block was present for several days then spontaneously disappeared. Recovery was without further incident.

COMMENT

The results obtained in this series of cases support the demonstration by others that direct repair of atrial and ventricular septal defects can be effectively and safely accomplished with the aid of extracorporeal circulation.

No attempt has been made to compare the bubble and vertical screen oxygenators. It appears that for periods up to thirty minutes, the care and preciseness with which perfusion and the operation itself are conducted are more important than the physical properties of the pump oxygenator. Certainly, within limits, the bubble oxygenator employed in this series is relatively simple to use. In addition, the operative technic required for proper closure of most atrial and ventricular septal defects is not nearly so difficult or exacting as technics employed for surgery of other organs, although considerable experience is essential for a proper anatomic orientation at operation. On the other hand, the team required to ensure proper function of this apparatus and to monitor certain physiologic variables during operation is sufficiently large to preclude the use of the heart-lung apparatus in the average community hospital.

In any new field indications for treatment must evolve gradually and criteria for operability must be constantly revised. In no field is this more in evidence than in cardiac surgery. Thus, with the introduction of closed methods of repairing atrial septal defects operation was indicated only for patients with disabling symptoms produced by a large intracardiac shunt. Development of open repair of atrial defects under hypothermia more clearly defined the indications for treatment and, in general, it was agreed that a left-to-right shunt at least three times the systemic blood flow warranted surgical therapy. Subsequent experience with the closure of atrial defects using a heart-lung apparatus has further clarified the problem of when to operate upon these patients. We now believe that an atrial septal defect constitutes a greater hazard than does its operative closure, provided the diagnosis is clearly evident and a measurable left-to-right shunt is present. Similarly, ventricular septal defects producing a significant left-to-right shunt probably should be repaired irrespective of the severity of symptoms. The presence of a large right-to-left shunt precludes operation for isolated atrial and ventricular septal defects.

SUMMARY

1. Twenty-three patients on the Tulane Surgical Services have undergone intracardiac repair of atrial and ventricular septal defects. There were 2 post-operative deaths.

2. Cardiac catheterization was performed in all patients, and the correct diagnosis was established in each case.

3. The increasing safety of intracardiac surgery warrants broadening the indications for operative treatment of septal defects. Such treatment is advised in all patients with significant left-to-right shunts through septal defects.

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MALIGNANT LYMPHOMAS AND LEUKEMIAS *

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A complicated classification of the malignant lymphomas adds little to our knowledge and is of practically no clinical significance. For the purpose of this discussion, I shall simply classify them as follows:

1. Giant follicular lymphoma
2. Lymphosarcoma
3. Reticulum cell sarcoma
4. Hodgkin's disease

GIANT FOLLICULAR LYMPHOMA

Giant follicular lymphoma, or Brill-Symmer's disease differs from the other lymphomas in its slowness of growth, its tendency to remain quiescent for longer periods of time, and the frequency with which it appears as a solitary lesion. Retroperitoneal lymph nodes are very commonly involved and, unlike lymphosarcoma, involvement of the gastrointestinal tract, or tonsils is quite infrequent. Because of the relatively benign course and very slow development, the disease is frequently rather far advanced when first seen. Histologically, there is a numerical and dimensional increase in the size of the lymph node follicles. The cells involved may be either of the lymphocytic cell or the reticulum cell type. The differentiation from hyperplasia of a node due to infection may be quite confusing, but the absence of phagocytosis and the involvement into the medullary portion of the node together with interfollicular immature cells showing mitotic figures are all evidence of neoplastic disease rather than infection. Eventually, in the advanced stages of the process, the architecture of the lymph node becomes obliterated and the histological structure is that of lymphosarcoma. The condition is remarkably radiation sensitive and the majority of patients live for five years. Survival for ten years and even longer is not infrequent.

LYMPHOSARCOMA

In lymphosarcoma of the lymphocytic cell type the predominant tumor cell is a small cell that is slightly larger than a small lymphocyte. On section the involved lymph nodes are replaced by yellowish gray homogenous cellular tumor. The architecture of the node is erased and the tumor characteristically grows in the surrounding loose perinodal tissues. Like all lymphomatous processes, lymphosarcoma exhibits great variation in the location and organs involved and no organ is exempt from attack. Lymphosarcoma is not

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necessarily a generalized disease in all cases. Many cases are seen which are apparently primary in the nasopharynx or in the tonsil and, from a standpoint of treatment and prognosis, behave as a localized disease offering a surprisingly good prognosis. Regato has reported 15 of 37 patients well and free of disease five years following radiation therapy for lymphosarcoma of the tonsil. Lymphosarcoma is oftentimes seen as a localized disease involving the gastrointestinal tract; particularly the stomach. Snoddy collected reports of 474 cases of lymphosarcoma of the stomach, of which 50 patients survived more than five years. Individual reports show a considerably better five year survival. However, when the disease process is generalized, long term survival of five years or more is possible in only 2 to 3 per cent of the cases and the majority of cases die within one year.

RETICULUM CELL SARCOMA

Reticulum cell sarcoma may involve any tissue of the body, but it seems to involve bone more often than do the other types of malignant lymphoma. The characteristic cell is considerably larger than in the case of the lymphocytic cell type of lymphosarcoma. The appearance of this tumor as a solitary bone lesion is not infrequent and in such cases the prognosis is relatively good. Coley has reported 40 per cent five year survivals in a series of 20 patients treated with radiation therapy. Reticulum cell sarcoma of bone usually begins with pain localized to the site of the disease. Local swelling occurs early and local heat is common. The tumor begins in the metaphysis of bone and extends to involve a large area of the diaphysis. In early cases there is only a mottled type of destruction of bone with periosteal thickening but later expansion and destruction of cortex is observed. The lesion has oftentimes been misdiagnosed as osteomyelitis. When reticulum cell sarcoma is a generalized disease, it behaves as lymphosarcoma, and most patients with generalized reticulum cell sarcoma die within a period of one year.

HODGKIN'S DISEASE

Hodgkin's disease is perhaps the commonest of the malignant lymphomas and is seen very frequently in young adults. It is twice as common in men as in women. Clinically one can divide Hodgkin's disease into three different forms: (1) a chronic form with very slow development, in which the peripheral or purely lymphatic manifestations predominate; (2) an intermediate form which includes about half of the cases with faster development and early visceral manifestations; and (3) an acute form with early anemia, rapid weight loss, and early demise.

The most frequent first symptom of Hodgkin's disease is a painless enlargement of a peripheral lymph node. However, in a few cases, the disease begins as a rapidly progressive febrile disease, with progressive anemia, toxicity, and weakness. Nice and Stenstrom prefer to divide Hodgkin's disease into three stages: Stage I, in which there is involvement of only one lymph node region, or a single lesion elsewhere, with no constitutional symptoms; Stage II with involvement of two or more lymph node regions confined to the upper or lower trunk with or without constitutional symptoms; and Stage III, involvement of multiple lymph node regions with or without constitutional symptoms, or acute Hodgkin's disease with no obvious lymphatic involvement. When the disease is generalized, the Pel-Ebstein type of recurring paroxysms of fever and rather severe pruritis are rather characteristic clinical features.

Biopsy is of course essential to diagnosis and the only cell which must be present in order to make a diagnosis of Hodgkin's disease in a lymph node is the Reed-Sternberg cell. This cell varies between 12 and 40 microns in diameter; it has an irregular shape, and its nucleus may be lobulated or multilobed. The chromatin of the nucleus appears in dense aggregates and large nucleoli are the rule. The cytoplasm varies from eosinophilic to basophilic and reticulum stains often reveal reticulum within it. Unless unequivocal Reed-Sternberg cells are seen a micro-

scopic diagnosis of Hodgkin's disease should not be made.

Stenstrom and Nice have reported 208 patients with Hodgkin's disease treated with radiation therapy. Of the patients with Stage I disease, 85 per cent survived five years and 77 percent ten years. Stage II cases showed a five year survival of 90 per cent and a ten year survival of only 35 per cent. Stage III patients had a five year survival of 10 per cent and a ten year survival of only 2 per cent.

All lymphomas show a remarkable degree of radiation sensitivity and the standard method of treatment is radiation therapy. The patient with localized lymphoma, such as a case of lymphosarcoma of the tonsil or stomach, or a patient with reticulum cell sarcoma localized to one bone, must have treatment designed so as to give the patient the maximum possible chance of cure. Surgery and radiation therapy are not complementary procedures. If the tumor can be entirely eradicated by surgery, radiation therapy is useless. Whereas, if radiation therapy is indicated after surgery it implies that excision was incomplete, and consequently, useless. It is our practice to treat such cases with radiation therapy alone and to deliver a dose of 3000 to 4000 roentgens in a period of about one month. If the disease is generalized or if constitutional symptoms are present, excessive dosage in this range is obviously impossible, and the areas of involvement should be treated with 1000 to 2000 roentgens, depending upon the extent of involvement.

Spray radiation therapy is indicated in the patient with acute Hodgkin's disease in whom no lymph node enlargement can be detected and no tumor masses can be felt. It can also be used to good advantage in the patient with extremely advanced disease and severe constitutional symptoms. The body from the neck to the knees is treated as a single field and the treatment distance must be extended to two meters in order to cover this wide an area. A dose of 25 roentgens in air is given to each anterior and posterior field. Although the improvement following spray radiation is of short duration, it is most gratifying and helpful in the care of many patients.

Radioactive phosphorus can be used instead of spray radiation but offers advantage over the method using x-ray.

Nitrogen mustard can be of great help in the management of the patient with malignant lymphoma, particularly in the patient with Hodgkin's disease. The usual total dosage of nitrogen mustard is 0.4 mg. per kilogram of body weight, divided into either two or four equal daily doses. Nitrogen mustard in this dosage produces rather severe nausea and vomiting and rather heavy sedation prior to such therapy is of considerable help. Nitrogen mustards exert a specific nuclear toxic effect by interfering with the chromosomal mechanisms and mitotic activity and further, the susceptibility of tissues is related to the rate of cellular division. This explains the vulnerability of bone marrow, lymphatic tissue, and rather anaplastic malignant tissue in general. Peripheral blood studies show pancytopenia as a result of the drug, but this is of relatively brief duration and is not a great source of worry. It is important that we carefully evaluate the role of nitrogen mustard in the treatment of Hodgkin's disease. First, nitrogen mustard is incapable of producing permanent sterilization of local tumor masses. Second, it does not have near as profound an effect on masses of neoplastic tissue as does irradiation. Third, the duration of remission of disease produced by nitrogen mustard is considerably less than that produced by irradiation. As a result, nitrogen mustard must not be considered a substitute for irradiation. It must be considered an adjunct to radiation therapy.

The points in favor of using nitrogen mustard therapy would be severe constitutional symptoms such as fever and pruritis, absence of localized tumor masses, and acquired radiation resistance of the lesion—that is, the disease which no longer responds to radiation therapy. Gelhorn

and Collins compared the course of the disease in two groups of patients: 67 who received radiation therapy and nitrogen mustard in alternating courses, and 65 radiation therapy alone. No significant difference in the four year survival rate was found in the two groups. However, the amount of radiation required was less, the asymptomatic periods longer, and the economic burden lighter for patients receiving radiation and nitrogen mustard, than for patients receiving radiation therapy alone. Nitrogen mustard is thus a useful adjunct to radiation therapy in the management of Hodgkin's disease. It reduces the requirements for radiation but does not actually prolong life.

LEUKEMIA

Leukemia can be considered a malignant neoplastic disease of the hemopoietic organs, involving primarily the bone marrow and the lymphatic and reticuloendothelial systems. Essentially it consists of an acquired inability of immature leucocytes to respond to forces normally regulating their proliferation and maturation. In this discussion we shall consider the common chronic varieties of leukemia only since acute leukemia is never successfully treated by radiation therapy.

Chronic lymphogenous leukemia is prevalent between 45 and 60 years of age and about three quarters of the cases occur in males. The outstanding first sign of chronic lymphogenous leukemia is enlargement of the lymph nodes, particularly in the cervical region. The involved lymph nodes do not become very large as a rule, usually not more than 5 cm. in diameter. In rare instances, there may be no peripheral adenopathy. Spleen and liver are usually enlarged several finger breadths below the costal margin. In chronic lymphogenous leukemia, the rise in the number of circulating leucocytes seldom reaches the very high values sometimes seen in the myelogenous variety. The total leucocyte count varies between 100,000 and 200,000 per cubic mm. The vast majority of these circulating leucocytes are adult lymphocytes presenting very little cytoplasm. Immature lymphocytes are seen but are in a relatively small proportion. About 10 per cent of cases show a normal or even subnormal white blood count. In such cases a bone marrow aspiration biopsy is necessary for diagnosis.

Chronic myelogenous leukemia is most frequently found in individuals between 20 and 60 years of age, the highest incidence occurring between 25 and 30 years. About two-thirds of all cases are found in males. There is rarely any enlargement of the peripheral lymph nodes in the early stages and the outstanding symptom is considerable enlargement of the spleen which may extend to the pubis. This spleen causes a sensation of heaviness and dragging. Tenderness of the sternum is found in the majority of patients. In chronic myelogenous leukemia, the leucocytosis is usually extremely high and may reach 1,000,000 white cells per cubic mm. The majority of these cells are polymorphonuclear leucocytes, and in addition, there are a great number of metamyelocytes and myelocytes, most of which are neutrophilic. Eosinophilic leukemia is extremely rare, and before a diagnosis is made, it should be remembered that eosinophilic myelocytes are frequently present in myelogenous leukemia, and also, that basophiles and eosinophiles may be present in large quantities in the circulating blood in other conditions.

In the later stages of both chronic lymphogenous and myelogenous leukemia, the symptomatology and clinical findings are quite variable and are dependent upon the areas of reticulo-endothelial involvement and upon the areas of leukemic infiltration. Enlargement of the mediastinal nodes may produce cough and dyspnea. Retroperitoneal lymph node enlargement produces gastrointestinal disturbances, distention and abdominal pain. Enlargement of the spleen produces a sensation of heaviness and dragging in the abdomen, and infarction of the spleen results in acute pain which may mimic an acute surgical abdomen. Bone marrow replacement may produce rather severe local bone pain and of course the associated anemia

produces pallor, fatigue, palpitation, and hemic murmurs. The increased metabolism associated with active chronic leukemia plus the inevitable anemia produces perspiration, easy fatigue, intolerance to heat, weight loss, increased appetite and increased pulse rate.

Thrombocytopenia is manifested by petechia, purpura, and hemorrhage. Leukemic infiltration of the gastrointestinal tract causes diarrhea, nausea and vomiting, and occult blood in the stools. Involvement of the central nervous system is manifested by paraplegias and cranial nerve paralyses. Infiltration of the kidneys may be associated with renal failure, renal colic, and pyuria. A diffuse infiltration of the lungs produces a rather severe dyspnea.

Radiation therapy is the principal weapon in the management of chronic leukemia. When a marked enlargement of the spleen, producing a dragging sensation, is the main objective finding, radiation therapy can probably best be directed to the spleen itself through anterior, lateral, and posterior parts. A reasonable plan is to deliver 100 roentgens in air a day to one port, alternating ports, and anticipating a total dose of about 600 roentgens. It is extremely important to do daily blood counts, and if there is more than a 10 to 15 per cent drop in the white count per day, discontinue therapy for a few days, until the count begins to level off. Then therapy can be started again at a reduced daily dosage. One cannot really evaluate the results of therapy until about two to three weeks after completion of therapy. At that time it may be obvious that a larger dose is required.

If enlargement of peripheral nodes is the most objectionable feature of the disease, radiation therapy can be delivered to the involved lymphatic areas. About 200 roentgens in air daily for two or three treatments can be given to each involved lymph node area with excellent regression of the tumor masses, and an excellent reduction in white count.

In a great many of the cases of chronic leukemia, systemic symptoms such as easy fatigue, intolerance to heat, weight loss, increased pulse rate, vague gastrointestinal symptoms, and shortness of breath, are the principal features of the disease. Since chronic leukemia involves the bone marrow and the entire reticulo-endothelial system, spray radiation to the entire body becomes the most effective method of radiation management. The patient is placed at a target skin distance of about two meters, and the area of exposure should extend from the neck to a point below the knees, the eyes and gonads being protected by lead shields. Alternating sides of the body are treated. The dose in air at the skin surface should rarely exceed 25 roentgens, per treatment, and the usual dose would be of the order of 15 to 20 roentgens. Great caution must be exercised not to give too much spray radiation before biological effect is determined.

Radioactive phosphorus is also an excellent method of management in cases of chronic leukemia and produces virtually the same effect as spray x-ray therapy. A reasonable dosage scheme would be 2 millicuries of P^{32} injected every two weeks.

It is impossible to predict in advance what quantity of radiation will be necessary to control the symptoms in any case of chronic leukemia. Nowhere in radiation therapy is good clinical control of dosage more important. The symptoms caused by the disease in the particular patient, the physical findings encountered, the basal metabolic rate, the white count and differential, the degree of anemia and thrombocytopenia, all must be carefully evaluated in order to determine the quantity of radiation necessary to produce maximum relief of symptoms and maximum increase in longevity, and also in order to prevent complications from the radiation itself. Sometimes, when the peripheral blood count is low, increase in the red cells in the circulating blood can be accomplished by giving small doses of spray radiation. Before doing this, however, a bone marrow biopsy must be done in order to be sure that the bone marrow

is not aplastic. If the bone marrow is very active, one can assume that the red cells are literally crowded out by the abundance of white cells. However, if it is aplastic, radiation therapy can be disastrous. It is impossible to use any one criterion such as the white count or the basal metabolic rate in determining when a case of chronic leukemia should be treated or how much dose should be used. The total clinical picture must be evaluated in order to come to some reasonable conclusion.

From my own personal experience in the management of chronic leukemia, I have come to several rather basic conclusions. First, that the least amount of radiation that will produce adequate relief of symptoms is the best dosage. This can be determined far easier if one does not treat the patient every day. It requires time for radiation effect, and if the time between each individual treatment is lengthened to a period of several days, and the total treatment time is prolonged, adequate clinical control of dosage becomes far easier, and more accurate. Second, I believe that one needs very little excuse to re-treat a case of chronic leukemia. It is far better to treat the patient when the blood count just begins to increase, when anemia begins to become slightly more severe, when the basal metabolic rate begins to increase, or when the patient begins to show some symptoms such as fatigue, anorexia, loss of weight or bone pain, than to wait until the patient gets in poor general condition. Constant observation is therefore essential. Third, one must not rely on radiation alone. Blood transfusions, are of tremendous value and iron therapy is frequently helpful. The possible benefit from cortisone therapy must not be overlooked. Obviously, the mental status of the patient is of paramount importance. In other words, one must treat the patient as well as his disease.

Osgood and Seaman have treated 163 patients with chronic leukemia using a program of titrated, regularly spaced total body radiation. The principles of this method are: (1) To bring the disease under initial control by small doses of either spray x-ray or radioactive phosphorus. In order to accomplish this the patient is given 15 roentgens total body radiation once a week or about 25 microcuries of P^{32} per kilogram body weight every two weeks. (2) To maintain control of the disease by minimal doses of spray x-ray or radioactive phosphorus at appropriate intervals so that the patient will remain in an optimum state of health just as the insulin requirements of the diabetic are repeated to maintain his ideal status. (3) Most important is to adjust the treatment to the needs of the patient; that is, to titrate the amount of radiation given against the clinical condition. Using this method, the authors achieved a median survival of 4.2 years in 163 cases. This is probably the best plan for the radiation management of chronic leukemia yet proposed.

CONCLUSION

In conclusion, I would like to emphasize the following:

1. Lymphadenopathy in a child may not be inflammatory in nature; lymphadenopathy in an adult is not necessarily neoplastic, therefore, biopsy is necessary for accurate diagnosis.

2. Early localized malignant lymphoma may be a curable disease—do not deny the chance of cure by undertreatment.

3. Fever of undetermined origin may be Hodgkin's disease—but one must think of the diagnosis before proving it.

4. In the management of advanced malignant lymphoma, and in the treatment of leukemia, frequent and careful observation of the patient and close clinical control, are the keys to the successful management of the disease.

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THE MANAGEMENT OF DYSFUNCTIONAL UTERINE BLEEDING DURING ADOLESCENCE *

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The onset of menstruation is considered to occur at approximately 13 years of age. Perhaps it would be more appropriate to assert that some more or less cyclic loss of blood from the uterus commences at that time. The first function of the ovary to be developed is the secretion of estrogens by the growing follicle. After varying periods, ovulation is initiated and is followed by the formation of a corpus luteum. This body continues the production of estrogen, and in addition, secretes progesterone. The latter creates a secretory endometrium from which menstruation in the true or mature sense occurs. During this period of lag in development of the complete functional state of the ovary, the endometrium is exposed to unopposed stimulation by varying amounts of estrogen. It is possible, under this circumstance, for the young girl to experience fairly regular cycles of bleeding from the uterus, or it may be that the amount, duration and interval will vary sufficiently to warrant the designation of "dysfunctional bleeding". Therefore, atypical bleeding occurring in members of this age group is caused predominantly by partial failure of function of the ovary, usually temporary, and the functional failure rarely is associated with local or general bodily disease.

Still, this is not to say that the possibility of local or general bodily disease should be ignored in evaluation of the given patient. General bodily conditions, if I may use that term in contrast to "disease," sometimes do influence the progress of development of the function of the genital tract. That is, the tissues involved are young, and are in the process of growth and development; therefore, they are more susceptible to conditions of environment than they will be after maturity has been attained. For instance, it is well known that deficiencies of diet and aberrations of nutrition, such as obesity and the state of being markedly underweight, have adverse effects on the

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functions of the anterior lobe of the pituitary body and the ovaries.

Fortunately, the great majority of adolescent girls, even though they may experience some dysfunctional bleeding, attain maturity in which normal menstruation takes place spontaneously. Accordingly, only a minority will need or seek medical care. This may cause you to wonder why I have elected to discuss this subject. I do so for the reason that dysfunctional bleeding frequently is discussed as it pertains to patients of all ages, and thus there is a tendency to consider the adolescent patient in common with members of the older age groups and to treat them similarly. To me this does not appear to be the correct approach, for these young patients do pose some particular problems. One of these, often not encountered among women who have reached the adult state, is the obligation of the physician to exert every effort to preserve the reproductive function. This, of course, means that radical measures of treatment are to be considered only as a last resort. Happily, in view of the facilities for treatment now available, it is most unusual to be confronted with this extremity.

DILATATION AND CURETTAGE

It is commonly said that dilatation and curettage of the uterus will effect a cure in 50 per cent of all females who are afflicted with dysfunctional bleeding. I wonder whether this statement does or should apply to the group of patients under discussion. I do not believe that curettage will alter the basic deficiency in these young girls in whom hormonal control of menstruation is as yet incomplete. Emphasis is placed on the necessity for microscopic examination of the endometrium prior to treatment. From a scientific point of view this may be admitted. From a practical point of view the validity of such an action may be debated. Experience has revealed that in only 1 or 2 per cent of these cases will an atrophic endometrium be encountered. In the remainder varying degrees of proliferation of the endometrium will be present. Therefore, it seems rational to me to initiate treatment by the administration of cyclic steroids and to vary the medication according to the response. Curettage would then be reserved for those patients whose condition refuses to respond to such treatment or for those in whom the operation becomes necessary for hemostasis. Another variation among these young patients is the fact that growth and development will be in progress during the course of the condition, a circumstance that will be responsible for cure, in the majority of cases. This fact materially affects our approach to treatment, for even when some therapy is judged necessary it may be purely supportive, in the nature of dietary measures and the administration of iron if it is needed. When specific hormone treatment is required it is not employed with a curative objective, but is substitutional and supportive. It is employed only until the endogenous production by the patient's ovaries of the hormones necessary to normal menstrual function can get under way.

HISTORY

The circumstances under which such a patient will visit your office are different from those which impel the adult patient to seek counsel. The young patient usually is accompanied by her mother, to whom the daughter's condition may be a new experience. The mother naturally is concerned by the possibility of organic disease and the effect of the loss of blood on the health of the daughter. For the young patient the reason for the visit is indeed a new experience. Very likely she has learned that none of her friends suffers from a similar state. She resents a situation that may have handicapped her activities and which possibly has provoked embarrassing episodes of bleeding. Moreover, she often is not pleased by the prospect of a visit to the physician's office and an impending examination.

The history of the atypical bleeding will vary greatly, so that among these patients there will be no constant pattern, amount or duration of flow. It is not easy to formulate any exact criteria for evaluation of the significance of the bleeding. Continued loss of blood for several weeks, even though it may be slight, and frequent episodes of heavy flow and sudden gushes of blood are significant. The effect of the condition on

the general state of the patient, meaning the production of anemia and the emotional reaction, merits consideration. The age of the patient and therefore the duration of the problem must be carefully considered; for example, a girl of 13 years may have had some minor problem of bleeding for six months, whereas another girl, say 16 years old, may have experienced dysfunctional bleeding for three years. Naturally, the significance of the complaint often will be determined largely by the results of the physical and laboratory examinations.

INVESTIGATIVE PROCEDURES

Despite the fact that a relative minority of these bleeding problems are serious, I think that if the condition has warranted a visit to the physician, sufficient investigation should be carried out to obtain an adequate diagnosis. Occasionally the physician sees patients of this type for whom no examinations had been performed before or during the administration of treatment. As has been said previously, we have very rarely encountered serious organic disease among patients of this age group, but the possibility of such entities as functioning ovarian tumors or blood dyscrasias cannot be discounted.

The general physical examination usually offers no difficulty, nor should examination of the pelvic viscera. The latter procedure can be accomplished satisfactorily through the rectum. The well-lubricated finger is placed against the anus and is slowly introduced while the patient strains, so that the sphincter is dilated. With the patient's abdominal muscles relaxed, the condition of the uterus and adnexa can be determined easily. The vagina and cervix can be inspected through a small tubular speculum or Kelly urethroscope. Some topical anesthetic agent can be applied to the hymenal ring, if necessary. In my experience the patient is rare indeed for whom the necessary examinations cannot be carried out in the office.

The number and character of the laboratory examinations to be performed will depend on the results of evaluation up to this point. The laboratory examinations needed naturally will vary from patient to patient. It would seem that a hematocrit reading and determination of hemoglobin are minimal requirements. Although defects in coagulation of the blood are rare among such young patients, it may be wise to perform one or two screening tests to eliminate this possibility. Determination of the basal metabolic rate occasionally will throw some light on the cause of the condition.

TYPES OF DYSFUNCTIONAL BLEEDING AND TREATMENT

When the foregoing diagnostic inventory has been completed I have found it convenient to consider the patient as a member of one of three categories. The first and largest will include those patients in whom no local or general bodily abnormality is present, and whose dysfunctional bleeding is of no significant consequence. Under these circumstances, the background of the condition is reviewed with the mother and the patient. Thus, fears are allayed and understanding replaces misunderstanding. Adequate nutritional requirements are outlined. When obesity or inadequate weight is present it should be adjusted by appropriate dietary measures. The temptation to prescribe hormone preparations for a patient of this type should be resisted.

In the second group are those patients who have experienced a loss of blood sufficient to produce significant anemia and perhaps disability and inconvenience—a chronic state but not one of emergency. In this instance the physician must consider, in addition to a diet high in protein and vitamins and the oral administration of iron, some specific therapy intended to regulate the loss of blood. I have emphasized the deficit of progesterone and the persistence of the stimulation of estrogens to the endometrium in these patients. Therefore, it may seem paradoxic to suggest the use of estrogens alone as a trial of treatment. Nevertheless, in my experience, the oral administration of Premarin for three weeks in each four weeks often has controlled the bleeding. This action arises from the fact that while the effect of estrogen is unopposed, the bodily level of estrogen may wax and wane and thus result in withdrawal bleeding from the proliferated endometrium. The admin-

istration of estrogens will consistently maintain the bodily concentration above the bleeding level, and thus obviate the process of withdrawal bleeding.

If some cycle of bleeding is present, administration of the agent is commenced on the first day of the flow and is continued for three weeks. When no semblance of a cycle exists, use of the medication may be started at any time. The doses will vary somewhat among patients, but generally 1.25 mg. is employed three times a day. Shortly after completion of the course of treatment withdrawal bleeding will occur. The next cycle of therapy is commenced in one week, twenty-eight days after the first day of the previous course, regardless of the presence or absence of bleeding.

I have preferred this program of treatment to the repeated intramuscular injection of estrogens, for I believe the oral treatment I have described ensures maintenance of a more constant level, and it is more convenient and less expensive for the patient. Presently, however, long-acting preparations of estrogen, such as Delestrogen, are available. Twenty milligrams of this preparation is administered intramuscularly on the first day of flow or at any time, if no cycle can be determined. This injection is repeated at intervals of twenty-eight days. As a rule, the administration of estrogens will not inhibit the bleeding for a few days. If the loss of blood is excessive, it can almost always be controlled by the intravenous injection of 20 mg. of premarin injectable. This is then followed by one of the forms of cyclic administration mentioned previously. If this form of treatment proves effective it should be continued through four twenty-eight-day cycles. It may then be stopped or, in some instances, it may be well to continue for two more cycles with a reduction in the dose.

If the administration of estrogens alone does not prove effective, progestational steroids should be added to the therapeutic program. Use of these agents is commenced on the fourteenth day of the twenty-one days that the estrogens are given. As is true of use of the estrogens, we prefer to employ orally administered preparations initially, for in many cases they have proved effective. We have used 30 to 50 mg. of Pranone daily for seven to ten days, and have found the results satisfactory when an estrogen-primed endometrium is present. Recently, steroids with progestational activity have been derived from 19 nor-testosterone and are effective when they are administered orally. Norlutin and Enovid are examples. They are administered daily in a dose of 10 mg. for seven to ten days, beginning on the fourteenth day of the estrogen therapy. Progestational steroids can be administered intramuscularly. One of the most effective preparations is Delalutin. This is a long-acting agent. It is administered in doses of 125 to 250 mg. on the fourteenth day, and will provide an effective bodily concentration for seven to fourteen days. Pure progesterone can be given in a single injection of 100 mg. or in divided doses of 25 mg., for four doses every third day. I do not believe this will prove as effective as the long-acting preparation.

Another convenient and effective form for the administration of progesterone is found in colprosterone vaginal suppositories. These are available in 25 and 50 mg. units. One or two are used daily for seven to ten days. It should be remembered, when these combinations of estrogen and progesterone are employed, that the administration of estrogens should be continued during the time the progesterone is given, at least for the first week. The latter is effective only on an endometrium previously primed with estrogens. It is also true that progesterone is most effective on an endometrium in which the estrogen stimulation is maintained. Under the circumstance of normal endogenous ovarian function, this condition obtains, for the corpus luteum secretes estrogens as well as progesterone.

There remains a consideration of the cyclic administration of progestational steroids without the preliminary and coincident use of estrogens. If endogenous estrogen is available in sufficient amounts, the bleeding can be controlled. Thus the cyclic administration of these substances, as mentioned previously, can be a rational trial of treatment.

Presently there are numbers of estrogenic and progestational steroids available for various routes of administration. May I point out that the preparations I have mentioned are simply those with which I have had some experience. Similarly effective preparations are available under other names.

No one has explained the exact relationship between the function of the thyroid gland and the function of the ovaries; however, over the years thyroid extract has been administered to many patients suffering from all types of menstrual dysfunction. Perhaps this form of treatment has received more credit than it deserves, for frequently the doses employed have been too small to be considered effective. Nevertheless, if the basal metabolic rate is found to be lower than normal, I believe the administration of thyroid extract or Cytomel has a place in the treatment of this group of patients. Sufficient amounts of these medications should be employed to elevate the basal metabolic rate to normal and to maintain the rate at normal. I am aware that estimations of protein-bound iodine and of the uptake of I^{131} are more accurate measures of thyroid function than is the basal metabolic rate. Yet clinical experience with the use of the above preparations on the basis of the basal metabolic rate alone seems to warrant this form of treatment.

The third group contains the relatively rare patient to whom blood of proper group and Rh factor must be administered because of marked anemia, and curettage performed for the control of hemorrhage. An alternative to currettage is the intravenous administration of 20 mg. of premarin injectable. If necessary, this measure is repeated within four hours, once or twice. The bodily concentration of estrogen is thus elevated above the "bleeding level." When this treatment is used in combination with replacement of blood by transfusion, if necessary, it has proved very effective. Both of these procedures should be followed by use of the cyclic steroids previously mentioned to prevent recurrence.

COMMENT AND CONCLUSIONS

Dysfunctional uterine bleeding is not uncommon during adolescence, but most of the patients will need no treatment.

In the minority of such patients who do need treatment certain problems peculiar to members of this age group should be borne in mind. These problems are described. It follows that patients of this type should not be considered in common with older women who experience dysfunctional bleeding.

An increased understanding of the physiologic processes involved and significant developments in the medications available have greatly facilitated satisfactory treatment.

THE EFFECTS OF PROMAZINE ON PSYCHIATRIC SYMPTOMS

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The use of promazine hydrochloride,† a phenothiazine derivative, has been reported helpful in the management of psychiatric patients.[1-4] The drug has shown particular value in the relief of acute alcoholic and drug withdrawal syndromes,[2,5] and it has been compared favorably with the other ataractics. The present study was undertaken to investigate the clinical effects of promazine in the treatment of a group of neurotic and psychotic patients and, insofar as possible, to quantitatively compare reactions to the drug with the effects of a placebo on the principal symptoms demonstrated by the patients.

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† Promazine hydrochloride or Sparine was supplied by the Wyeth Laboratories, Philadelphia, Pennsylvania.

METHODS

Promazine was administered to a total of 83 patients, of whom 69 were out-patients attending the Psychiatric Clinic of the Charity Hospital of New Orleans, and

14 were in-patients on the psychiatric wards of that institution. The diagnostic categories represented are shown on Table 2. All patients received supportive psychotherapy during the course of the drug study.

A double-blind procedure was employed, with neither the investigators nor the patients being aware of whether the medication consisted of the drug or a placebo. The individuals who administered the medication took no part in the clinical evaluation of the results; this was performed by the authors. Forty-two of the patients began the study on promazine; forty-one on the placebo. After two weeks the placebo was administered to the group who had begun on promazine, while promazine was received by the group originally on the placebo.

Following the one month double blind period, many of the patients were given the drug for longer periods of time, to determine the effects of more prolonged treatment. Thus, while the minimum period for treatment with promazine was two weeks, the average duration of drug therapy was twenty-five days, with a maximum of three months on promazine for several patients. The dosages employed ranged from a minimum of 50 mg. b.i.d. to a maximum of 400 mg. q.i.d. The drug was administered orally in all cases except one, for whom the intramuscular route was employed initially.

Patients were evaluated initially by the use of a psychiatric profile which ranked signs and symptoms on a four point scale, according to severity:

Mild—symptom definitely present but not severe enough for patient to seek relief from it

Moderate—severe enough for patient to seek relief, but not very disturbing

Marked—severely disturbing to patient, makes him markedly uncomfortable

Severe — overwhelmingly disturbing, enough to disorganize the patient.

The signs and symptoms so evaluated were: affect disorder, association defect, depersonalization, depression, anxiety, delusions, hallucinations, socialization defect, insomnia, anorexia, resistance to psychotherapy. This mental status examination was repeated at intervals of a week or less

TABLE 1.
QUANTITATIVE IMPROVEMENT IN THE SEVERITY OF SYMPTOMS[1]

	Placebo Followed by Promazine			Sparine Followed by Placebo		
	Number Observed with Symptom	Percent Improvement after Placebo	Percent Improvement after Promazine	Number Observed	Percent Improvement after Promazine	Percent Improvement after Placebo
Affect						
Flattened	31	9	7	28	19	19
Inappropriate	9	28	22	15	35	39
Assoc. Defect	10	9	24	16	21	14
Depersonalization	32	11	26	27	24	27
Mood						
Depressed	35	19	36	28	39	44
Euphoric	2	0	17	2	–200	100
Anxiety	39	15	34	35	35	41
Delusions	19	9	33	19	19	15
Hallucinations	17	34	40	12	20	36
Sociability						
Withdrawn	32	10	16	28	10	9
Extrovert	2	0	40	2	0	33
Insomnia	39	30	64	27	39	30
Anorexia	31	12	38	21	20	22
Amenability to Rx.	30	4	4	31	1	1

[1] For this table we averaged the severity of each symptom, as measured on the 4-point scale described above, for all patients showing that symptom. This average intensity of symptom was determined first prior to therapy and then compared with the average intensity after drug and after placebo. The results are expressed in terms of percentage of improvement.

for the in-patients, and bi-weekly for out-patients. In addition, the examining psychiatrist made an overall subjective evaluation of the patient's psychiatric condition at each visit, using a second four-point scale:

1. Slight improvement—some beneficial effects noted but as yet not enough to warrant further use of the drug
2. Moderate improvement—favorable results, but patient seeking further relief
3. Marked improvement — symptoms subsided, no longer disturb the patient
4. Recovered — symptoms subsided completely, both subjectively and objectively; patient socially productive.

Prior to medication, all in-patients received a thorough physical and laboratory examination which included electroencephalogram, electrocardiogram and x-rays of the chest and skull, to evaluate the possibility of organic pathology. For out-patients, a baseline white blood count, differential, and urinalysis were performed. For in-patients, the following blood chemistry tests were performed in addition: blood urea nitrogen, fasting blood sugar, thymol turbidity, cephalin flocculation, and alkalin phosphatase. These laboratory studies were repeated at two weeks intervals for all patients during the first month and at monthly intervals thereafter. Careful day-to-day check was kept on in-patients for blood pressure, pulse, weight, and temperature.

RESULTS

Definite improvement (moderate to recovered) was shown by 43 patients (49 per cent of the total group) while receiving the drug, 20 patients (22 per cent) showed slight improvement, 14 (17 per cent) were unchanged, and 6 (7 per cent) became worse. A statistical analysis was made, comparing the effects of the drug with those of the placebo, in the group who received the placebo first.‡ Significantly greater improvement was found during the drug period, with the probability of so great a difference occurring by chance at close to one in a hundred ($0.5 > p > .01$).

The reduction of the severity of the symptoms of patients receiving promazine as compared with those on placebo is detailed in Table 1. For this table the average severity of the individual symptom in all patients was determined prior to therapy, then compared with the average intensity after drug and after placebo. The results are expressed in terms of percentage of improvement and offer a rough quantitative estimate of the amount of improvement for each symptom. The drug is seen to have been significantly more effective than placebo in the relief of anxiety and insomnia to a high degree ($p < .01$). It was also effective with delusions, anorexia, and depression (agitated type) ($.01 < p < .05$). There was often a reduction in the frequency and intensity of auditory hallucination and in symptoms of depersonalization, but this was not significantly greater than with placebo. In general, patients tended to become less withdrawn, demonstrated somewhat better affect, and showed less association defect. It is clear from the table, however, that although the symptoms mentioned above did show definite improvement, they did not as a rule disappear completely.

The effects of promazine are correlated with diagnostic categories in Table 2. Of 59 schizophrenic patients treated, 27 (46 per cent) showed definite improvement (moderate - marked). The drug seemed generally to be most useful in those disturbances in which anxiety is a prominent component. Of particular interest were a number of cases in which there was drastic reduction of delusional and referential ideation (see case history).

The dosage eliciting maximum response varied from 50 mg. b.i.d. to 200 mg. q.i.d. Larger doses than these did not seem to be of any further value. In most cases the optimum dosage was 50 mg. q.i.d. Improvement on promazine was often noted

‡ A similar analysis of the group receiving drug first would not be valid because of the frequent persistence of the effects of the medication after it had been replaced by placebo.

TABLE 2.
EFFECTS OF DRUG CORRELATED WITH DIAGNOSIS

Diagnosis	Total	Results		
		Worse	No Improvement or only slight	Definite Improvement
Schizophrenia, chronic				
Paranoid	11	0	5	6
Undifferentiated	21	2	12	7
Schizo affective	3	0	2	1
Pseudoneurotic	11	2	3	6
Catatonic	1	0	1	0
Schizophrenia, acute				
Undifferentiated	7	2	2	3
Paranoid	5	0	1	4
Psychotic Depress.	2	0	0	2
Korsakoff's Syndrome	1	0	1	0
Anxiety Neurosis	7	0	2	5
Hysterical Reaction	2	0	1	1
Anxiety Reaction	2	0	1	1
Depressive reaction	5	0	1	4
Asthma	1	0	0	1
Personality Disorders				
Schizoid	1	0	0	1
Paranoid	1	0	1	0
Passive Dependent	1	0	0	1
TOTAL	82	6	33	43

during the first twenty-four hours and usually was most marked by the end of the first week of medication, although several weeks were necessary in some cases before maximum improvement was attained.

CASE HISTORY

The following case history is presented to provide an example of promazine's effects. It illustrates marked improvement sustained over a period of four months.

The patient was a 29 year old, white male farmer who had been seen in out-patient therapy for approximately two and a half years. The symptoms during that time ranged through the realm of paranoid schizophrenia; primarily he had symptoms of a hypochondriacal nature with somatic delusions. For example, he complained of the muscles in his arms aching "as if the muscles were being ripped off the bone", and he also brought in lists of his somatic complaints to the therapeutic sessions. Other symptoms included insomnia, chronic nightmares about his father, occasional crying spells, auditory hallucinations of a persecutory nature, fears of going out in crowds, and other symptoms of a referential and persecutory nature. No organic pathology was found in recent medical workups. He had frequently been known to be assaultive upon members of his family and to have threatened people in the community. Last year he had actually shot a former lodger of his in the head and barely missed killing him, but it seemed that this was a legitimate provocation for the first time. During the past two years his referential and persecutory ideas had gradually diminished, but his hypochondriacal and somatic delusions had remained about status quo.

Patient had been unable to work for two years and had been supported by United States Department of Public Welfare. He had been tried on various sedatives and on Thorazine without much benefit. On August 8, 1956, he was started on 50 mg. of Sparine placebo 4 times daily, and after two weeks he reported that he was able to sleep a little better, but other than this he had noted no change. He was then switched to Sparine drug, at the same dosage level, and after two weeks his nightmares about his father had completely disappeared, his hypochondriasis was greatly diminished, he was better able to go out in crowds although he still felt slightly nervous, for the first time in many months he did not bring in a list of his hypochondriacal complaints, and he no longer experienced auditory hallucinations.

He was still on the medicine, four months later, at the same dosage level, and was completely in remission except for a mild hypochrondriasis. Patient reported that he felt better than he had in many years, and that he took a correspondence course to learn how to be an auctioneer and now functioned in this capacity earning up to $50 a day. In addition to this, he had a job as a chicken feeder for the past six weeks and also helped out on a nearby ranch.

His wife was equally enthusiastic about his improvement.

Laboratory examinations were repeated first at bi-weekly and then at monthly intervals, and they failed to reveal any evidence of a toxic effect.

LABORATORY STUDIES

The changes noted on hemograms were as follows:

Leukopenia occurred in one case. While taking 100 mg. of promazine q.i.d., the patient's white blood cell count declined from a baseline of 4300 to 3600 in a thirty day period. The drug was discontinued, but a slow decline continued to 2600 during the next two weeks. The differential count remained normal. A sternal puncture at that time revealed scanty marrow clumps with a marked erythroid hyperplasia. The count gradually returned to normal during the next month. We cannot definitely state that the bone marrow depression was due to promazine, but the suspicion is strong in view of the fact that this patient was on no other medication and that agranulocytosis has been reported elsewhere with the drug.[6]

Six patients showed an elevation in eosinophile count ranging from 4 to 17/100 WBC. These patients had no clinical symptoms of any sensitivity reaction, and the significance of the eosinophilia is unknown. No changes in hemoglobin content were observed. Urinalysis, including microscopic examination of the sediment and test for sugar and albumen, revealed no alterations on the drug.

Thymol turbidity, cephalin flocculation and alkaline phosphatase studies were made on 15 patients. There was a questionable rise to abnormal levels in thymol turbidity in 2 cases and in alkaline phosphatase in 2 other cases. Unfortunately, we were unable to do follow-up studies to verify these findings. On all cases cephalin flocculation remained unchanged. No jaundice or other clinical evidence of liver disease was encountered. Blood-urea-nitrogen and fasting blood sugar revealed no abnormal alteration, but there was a tendency for the latter to decline slightly.

In 14 in-patients on dosages ranging as high as 400 mg. q.i.d. there was no significant alteration in pulse, respiration or temperature. Two patients showed a 20 mm. decrease in systolic blood pressure, but on no occasion did it reach hypotensive levels. The in-patients showed an average weight gain of 6.3 pounds.

SIDE EFFECTS

The most frequent side effect experienced was sleepiness. Twenty-three per cent of the patients complained that the drug made them too sleepy to perform their work adequately. An additional 30 per cent of the patients complained of a less pronounced drowsiness. Eight per cent were bothered by a dizzy or "drunken" sensation. A feeling of general lethargy occurred in 7 per cent. Other side effects, each encountered in 2 or 3 patients, were: vertigo, nausea, dryness of the mouth, nightmares, edema (without weight gain), and dermatitis. In many cases side effects tended to abate after the first three to four days of medication. They tended to increase in frequency and severity in doses higher than 100 mg. q.i.d. Those patients who complained most of side effects often experienced similar, although less severe effects while receiving the placebo.

SUMMARY AND CONCLUSIONS

Using a double-blind procedure, the clinical effects of promazine hydrochloride, a phenothiazine derivative, were studied in a group of 83 psychiatric patients, largely schizophrenics. The drug seems to have an ataractic effect, similar qualitatively to that of Thorazine. Forty-nine per cent of the patients showed definite improvement while receiving the drug. This improvement was significantly greater than that shown on placebo. It was especially efficacious in reducing anxiety and in ameliorating insomnia. Although frequent side effects were encountered, these were usually not severe enough to negate the value of the medication. One case of white blood cell depression occurred in this series, and since agranulocytosis has been reported to occur with promazine[3] as it does with other phenothiazine derivatives, routine white blood counts should be employed.

Since promazine may afford symptomatic relief and thus help in making the patient more amenable to psychotherapy, it is considered to be a useful aid in treatment in many cases.

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THE PROFESSIONAL LEGAL LIABILITY PROBLEM

The number of suits against physicians for legal liability is increasing. A study by the legal department of the American Medical Association, under Mr. C. Joseph Stetler, as director, has shown that about 14 per cent of physicians have had a medical professional liability claim or suit brought against them. California leads with one out of four, and South Carolina has had least, with less than one out of thirty-three.

A total of 18,500 physicians have had malpractice suits filed against them at some time. Of these, 40 per cent have been dropped or decided in favor of the physician. Specialists are more subject to such actions, whether justified or not, than others in the profession. The reasons behind this are both economic and medical. The specialist would be expected to have a higher income and carry more professional insurance than other doctors. He would also be more disposed to settle without a trial at a time when his reputation and professional standing are at their peak. In addition, the specialists, who constitute about one fourth of the profession, would be expected to handle the most difficult procedures with an attendant greater proportion of unfavorable results.

The doctor's defense in this situation requires that he prepare adequately in three ways.

The first is maintenance of adequate insurance. This is obvious. What is adequate insurance is not so clear. With a group organized among the lawyers working for a constant increase in court awards and the numerous decisions in six figures, the individual physician feels it a necessity to secure insurance coverage in similar amounts. On the other hand, the common knowledge that most doctors are covered and that the more prosperous ones are covered for larger amounts seems to invite legal claims and to encourage juries to name huge amounts in their decisions. The thought that insurance covers or should cover any amount the court decrees does not minimize the burden. The money comes ultimately from the earnings of the physicians who pay the premiums, and not from a mythical pool of insurance company money available for any court decision. As most physicians know the rates for insurance coverage in this field have increased sharply in recent years, and in some areas professional liability insurance is difficult to obtain. In the whole field of insurance, however, it is more necessary here to read the fine print and even between the lines of the

policies than in any other. The plan of one insurance group, which does not issue policies with high coverage, to utilize every legal means to defend every suit has merit.

The second defense against these suits begins the day the physician starts practice and consists of his continued adherence to all the professional, ethical, and moral precepts that have been instilled into him in all phases of his training and life's experience. While dependence on guidance of this type is a counsel of perfection, the thought of what is best professionally may be a substantial help in determining what is best legally. It must be said, however, that the application of the golden rule is not of itself sufficient protection to the physician. He must guard against deliberate distortions and misrepresentations. The law department of the American Medical Association is providing increasing help in such matters. An instance of this is their preparation of a variety of legal forms for signature by the patient. This documents the patient's consent to the anticipated procedures.

The third defense against these claims depends upon the physician's local society and its maintaining an adequate organization which will either adjust grievances or develop the facts in a legal conflict upon which the doctor's defense may rest. The activity of these local defense committees becomes necessary at the first indication of legal conflict, and is most effective before the case reaches trial. Their benefits are in proportion to the degree of cooperation obtained. Their action may be protective or aggressive. The suits not justly founded can be placed in their proper perspective. The others can have appropriate recommendations given to the principals.

The net result of having malpractice suits as proximate and increasing threats is that the public will suffer. The total expense, of necessity, ultimately falls on the doctor's patients and increases the cost of medical care. The physician, when placed in a position of having to fortify each statement with irrefutable proof and of having to anticipate remote possibilities, must have facts and supporting opinions. This brings the need for exhaustive laboratory tests and numerous consultants. By these means the hazard to the physician is reduced, but the cost to the patient is increased.

The attitude of the public which serves as the background for the increase in law suits not justly founded, and the legal awards in six figures are based upon two faulty and related ideas. These are not verbally expressed but are the basis for public judgment and action. One is that the physician must uniformly achieve a satisfactory result. The other is that medicine is an exact science, such that a given effort should command a desired result.

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ORGANIZATION SECTION

The Executive Committee dedicates this section to the members of the Louisiana State Medical Society, feeling that a proper discussion of salient issues will contribute to the understanding and fortification of our Society.

An informed profession should be a wise one.

REPORT OF THE PRESIDENT

The highlights of the Louisiana State Medical Society for the past year have been marked by events which were both triumphant and tragic.

Shortly after the inauguration of new officers, the State was visited by one of its worst natural disasters. Hurricane Audrey was responsible for the loss of more than 500 lives, including three children of one of our members.

The service of Cameron and Calcasieu Parish doctors during the hurricane will never be forgotten by the thousands of refugees to whom they rendered treatment and attention.

Shortly after the hurricane, the President visited Lake Charles during the Southwest Louisiana Graduate Medical Assembly. Besides enjoying

the Assembly and the hospitality of the sponsoring Society, this occasion provided an opportunity to meet Dr. Cecil W. Clark and to formulate plans for placing his name in nomination for the American Medical Association award which is given annually to a general practitioner who renders outstanding service to his community. It is now a matter of record that Dr. Clark won the award which the AMA has described as its outstanding medical public relations accomplishment for 1957.

The membership of the State Society is to be commended for the very rapid and excellent response to the letter soliciting financial assistance for three Cameron Parish doctors who were most seriously affected by Hurricane Audrey.

No other project in the history of the Society has received a greater quantity of favorable publicity than the vaccination campaign conducted under the auspices of the Committee on Gamma Globulin and Salk Vaccine. The Society did everything possible to encourage the people of the State to be vaccinated and members devoted countless man hours during the campaign. The Committee, which was headed by Dr. Philip H. Jones, is to be congratulated and commended for a job well done. The Society plans to continue the polio vaccination campaign on an annual basis until it has reached 100 percent effectiveness.

The Society is once again indebted to the Board of Medical Examiners for the time, effort and expense exerted during the past year to combat chiropractic practice in various sections of the State. As this report is written, the officers and members are again girding themselves for a renewal of the fight in the Legislature to prevent chiropractors from gaining legal status.

The Council on Medical Service and Public Relations is commended for many successful projects, including its very excellent presentation of CAPSULES, the monthly newsletter sent to members of the Society. This is unquestionably the most completely read of all our Society publications.

It is important to note that during the year, the Sixth District Medical Society conducted a special meeting to reorganize its administrative set-up. Although the President was unable to accept an invitation to attend this meeting, a complete report on what was done has been received and it is felt that this represents a progressive step in the right direction.

We have been very much impressed with medical facilities and the extremely high type of practice developing in the fast-growing section of Plaquemine. The doctors participating in this development are to be congratulated.

During the year, practically all sections of the State were visited either to attend meetings or for other purposes.

Trips to Shreveport included attendance at a meeting of the Shreveport Medical Society and also a special visit to the Louisiana State Fair where the Shreveport Society sponsored a highly successful "Medical Progress" exhibit in cooperation with the State Society. The exhibit contributed greatly to the cause of professional medicine and has tremendous prospects for future usefulness. It is hoped that the Louisiana State Medical Society will continue to participate with the Shreveport Medical Society in furthering and expanding this event which has proven itself by its merit.

Monroe was visited during the time of the annual convention of the Louisiana Academy of General Practice. The Academy members were extremely hospitable and extended the President of the State Society the very great privilege of sitting in with their Congress of Delegates and participating in its discussions.

A visit to the Rapides Parish Medical Society was made in conjunction with the 1957 Founders' Day program. Judging from the activities witnessed, the Society members are most active and progressive and their sessions were highly educational and enjoyable.

A trip was also made to Alexandria during the time of the reunion of the "120 Group" composed of doctors who served at Camp Beauregard during World War I. On this occasion, Dr. George F. Lull, Secretary and Assistant to the President of the American Medical Association and Commander of the "120 Group" in its active days was present.

During the year, two visits were made to meetings of the American Medical Association, including the annual meeting in New York and the clinical meeting in Philadelphia.

At the New York meeting, the subject causing the most discussion in the House of Delegates was social security proposals for doctors. The House was highly favorable to the Jenkins-Keogh Bill which the Louisiana State Medical Society went on record as favoring at its last Annual Meeting.

At the Philadelphia clinical meeting, the retiring president of the AMA denounced the Forand Bill. There was considerable discussion on the ever-controversial subject of water fluoridation, with the AMA finally approving it.

A special session on the Medicare program was very enlightening and was well attended.

From the viewpoint of our own State, however, the most important business at the Philadelphia meeting was the presentation of the medal for "The General Practitioner of the Year" to our own member, Dr. Cecil W. Clark of Cameron.

There were numerous other meetings which were attended during the year including staff banquets, installation meetings and discussions with insurance groups.

During one of the latter meetings, it was brought to our attention that in certain areas of the State, excessive discrepancies exist in the fees which different doctors charge patients for performing identical services. This situation has been particularly pronounced in one section of Louisiana for a number of years and has been under the observation of the State Society. It is our hope that this matter may be rectified in the near future.

At the Annual Meeting last year, the House of Delegates approved a plan for providing Louisiana newspapers with a weekly column devoted to general health subjects. Unfortunately, the project has not been inaugurated because individual members have failed to cooperate by submitting material from which the columns could be prepared. It is still believed that the health column plan is most worthwhile and a recommendation is offered for its institution.

One of the most sorrowful happenings of the year was the loss of our oldest member, the famed and highly revered Dr. Rudolph Matas. It is indeed fortunate that Dr. Matas' "History of the Louisiana State Medical Society", which was published under the chairmanship of Dr. Isidore Cohn, Sr., will always be with us as a permanent memorial to Dr. Matas and the invaluable contributions he made to professional medicine.

In closing, I wish to thank the entire membership for allowing me the privilege of serving as President. I most especially thank the various committees and the members of the Executive Committee for their extreme cooperation and untiring efforts toward making this year a very successful one.

My sincere thanks are extended to the Secretary-Treasurer for his guidance and counsel in difficult matters and for his laborious work in handling medical details incident to the duties of his office.

No report would be complete without a salutation to Miss Annie Mae Shoemaker, "Miss Louisiana State Medical Society," and her highly efficient staff of assistants. Space does not permit the listing of names of the many who have helped but I wish every one of them to know that their cooperation has been appreciated.

RECOMMENDATIONS

1. The Society formally request each specialty group to furnish a given number of columns pertinent to their own specialty and which are suitable for use by the Society in providing the newspapers of Louisiana with a steady source of material for a Society-sponsored weekly health column.

2. The Society cooperate more completely with the Shreveport Medical Society in conducting the "Medical Progress" exhibit at the Louisiana State Fair, particularly in furnishing help from various parts of the State to man the exhibits at least part of the time when the fair is in progress.

3. The Society approve continuance of present exemptions accorded non-profit hospitals by the Labor Management Relations Act (The Taft-Hartley Act). (Under the existing federal regulations, non-profit hospitals are released from the obligation of entering into negotiations with trade unions).

H. ASHTON THOMAS, M. D., President

MEDICAL NEWS SECTION

CALENDAR

PARISH AND DISTRICT MEDICAL SOCIETY MEETINGS

Society	Date	Place
Calcasieu	Fourth Tuesday every other month	Lake Charles
East Baton Rouge	Second Tuesday of every month	Baton Rouge
Morehouse	Third Tuesday of every month	Bastrop
Natchitoches	Second Tuesday of every month	
Orleans	Second Monday of every month	New Orleans
Ouachita	First Thursday of every month	Monroe
Rapides	First Monday of every month	Alexandria
Sabine	First Wednesday of every month	
Tangipahoa	Second and fourth Thursdays of every month	Indepencence
Second District	Third Thursday of every month	
Shreveport	First Tuesday of every month	Shreveport
Vernon	First Thursday of every month	

NOTICE TO FORMER GRADY HOUSE STAFF

An organization is being formed which is to be composed of all former members of the House staff of Grady Memorial Hospital in Atlanta. Two years ago, letters were sent to all known former House Officers. However, we know many names were not included because of an incomplete mailing list. If you did not receive a notice

or failed to reply for any reason please notify our office and let us know your name, address and when you were at Grady. Plans are now being made for our first annual meeting next fall.

Address: Grady Hospital Clinical Society, Office: G-610, 80 Butler Street, S. E., Atlanta, Georgia.

GOLF TOURNAMENT

The American Medical Golfing Association is holding its annual golf tournament in conjunction with the A.M.A. Convention June 23, 1958, at the beautiful Olympic Lakeside Golf and Country Club, San Francisco, California. This will be a whole day of rest and relaxation with golf, luncheon, banquet, and a prize for everyone. We have left no stone unturned to assure you the very best. Tee off time 8 AM to 2 PM. We cordially invite all golfing doctors to attend. Handicaps scratch to 30 in flights.

For information, contact James J. Leary, M. D., Secretary, 450 Sutter Street, San Francisco, California.

ANNUAL MEETING AND SCIENTIFIC SESSION, LOUISIANA HEART ASSOCIATION

Lake Charles, May 17, 1958

The annual meeting and scientific session of the Louisiana Heart Association will be held in Lake Charles on May 17, at the Majestic Hotel, Dr. George M. Anderson, President, L.H.A., announced.

Featured speaker of the scientific program will be Francis L. Chamberlain, M. D., San Francisco, California, President-elect, American Heart Association, and Associate Clinical Professor of Medicine, University of California School of Medicine. Dr. Chamberlain's subject will be "Practical Aspects of the Present Controversies on Etiology of Atherosclerosis."

Dr. Anderson said that registration will open at 8:30 a.m. Reservations may be made now through the L.H.A., P.O. Box 8397, New Orleans 22, La.

A symposium on Heart Disease and Employment will be held on May 16, with John A. Worley, M.D., Alexandria, Chairman, Rehabilitation Committee, L.H.A., presiding.

An all-day scientific session has been planned for nurses Friday, May 17. Miss Lydia Hall, Columbia University, will be a prominent participant.

A.M.A. FILMS

A revised list of films available through the A.M.A. motion picture library has been prepared and copies are available upon request from Motion Pictures and Medical Television of the American Medical Association. This catalog lists 87 medical films suitable for showing to medical societies, hospital staff meetings and other scientific groups. This catalog also includes 57 health films of interest to physicians who may be called upon to speak before lay audiences such as service organizations, Parent-Teachers' Associations, etc.

SOCIAL SECURITY

SOCIAL SECURITY SAYS: "A wife or widow under 62 or the divorced wife of an insured person may receive payments only while she has in her care a child (under 18 years of age) who is entitled to monthly payments."

In Other Words: Many widows who married in their 20's and lost their husbands in their 40's, would not receive any survivors' benefits until they reached age 62 because their children would be 18 or older.

SOCIAL SECURITY SAYS: "People are taxed only once for Social Security."

In Other Words: The employer who must pay his share of the social security tax for each of his employees increases the price of his product or service to cover this additional cost of doing business. Everybody pays this increase as a hidden "sales tax."

MEDICAL GRIEVANCE COMMITTEES SPREAD ACROSS NATION

More than 1,100 American county and state medical societies now have "medical juries"—grievance committees organized to mediate differences between doctors and patients.

The accomplishments and aims of grievance committees are outlined in a special article and editorial in the April 5 Journal of the American Medical Association.

Medical grievance committees are not really new. Since 1871 the committee on ethics and discipline of the Massachusetts Medical Society has been mediating the complaints of patients. What is new is the spread of the committees across the nation. During the last 10 years more than two thirds of the county societies and all the state and territorial associations have organized them.

Serving on these committees are between 5,000 and 10,000 physicians who fearlessly "judge complaints routinely in the twin light of public interest and professional service," the article said.

On one hand a committee may rule in favor of the patient, saying, for instance, about the doctor involved, "Fee for prenatal visits considered excessive."

On the other hand, it may decide in favor of the physician. One example is that of the patient who protested that he was charged $40 for "just one office visit." Investigation showed that, at his own request, the visit entailed a thorough examination including a fluoroscope study, electrocardiogram, and extensive laboratory work. When he understood what the fee covered, he withdrew the complaint with apologies.

"CASUAL ATTITUDE" CAUSES ELECTRIC SHOCK DEATHS

A casual attitude about electric current which "verges on the suicidal" is taking the lives of more than 1,000 persons each year.

This was reported in the current (April) Today's Health, the American Medical Association's popular health magazine.

A large number of these accidents involve children and housewives and result from a lack of understanding about the use and upkeep of electric appliances, according to the authors, T. Arthur Turner and Nicholas Shuman, both of Chicago.

Millions of people have experienced varying degrees of electric shock by handling household appliances with worn or damaged insulation. Most suffer no more than discomfort and immediately forget the incident.

The reason that some people suffer only minor discomfort and others death lies in body resistance to electric current. The body offers considerable resistance to normal electric current and is usually insulated in some manner so that when current enters the body and tries to get to the ground it is absorbed, they said.

However, this changes when a person is standing in water, which is a conductor of electricity. And if the voltage is high enough, resistance will be overcome regardless of the situation.

NUTRITION PLAYS SMALL ROLE IN SKIN DISORDERS

Contrary to common belief, most skin disorders are "not significantly connected" with dietary or nutritional allergies or deficiencies, according to an American Medical Association council report.

In fact, "dietary factors in acne vulgaris and psoriasis are generally overrated," Dr. Allen L. Lorincz, assistant professor of dermatology at the University of Chicago, said in the report prepared for the A.M.A. Council on Foods and Nutrition. The report appears in the April 12 A.M.A. Journal.

Malnutrition in the form of overeating, which leads to obesity, is by far the most frequently encountered nutritional disturbance that causes or aggravates skin diseases," Dr. Lorincz said. Obesity precipitates or promotes a variety of disorders of skin on opposing surfaces of the body (such as the corner of the lips) because of the accumulation of heat and moisture between folds of the skin.

Because dissipation of body heat by conduction and radiation is impaired by a thick subcutaneous fat layer, obese persons become overheated easily and tend to sweat more profusely.

Excessive sweating has an adverse effect on normal skin and especially on most inflammatory skin diseases. It affects a number of lesser known conditions—stasis eczema, which occurs on the legs, skin ulcers, and striae distensae, which results from excessive stretching of the skin.

ANTILEPROSY DRUG

An antileprosy drug called CIBA 1906 has been developed in that firm's laboratories here and in Switzerland.

Dr. T. F. Davey, head of the British Leprosy Research Unit Uzuakoli in Eastern Nigeria, tested CIBA 1906 for three years among leprosy victims in Africa. He reported in the January 1958 issue of **Leprosy Review** that it is "an antileprosy drug of considerable potential importance with outstanding qualities."

According to Dr. Davey, the drug's clinical and bacteriological activity was satisfactory and it prevented residual skin scarring and disfigurement when used with other active medications. He stated also that it was especially effective in treating children because its nontoxic nature allowed them the same dosage as adults.

Further investigations are now being conducted in 20 countries in Asia, Africa and South America. Additional clinical reports on the drug, its effects and potentials, will be presented at the International Leprosy Congress in New Delhi, India, in November. Dr. Rudolph L. Mayer, director of microbiology at the firm's plant here where the new compound was discovered, will attend the Congress.

VOLUME OF PHYSICIAN VISITS

The American people visited their physicians during the months of July, August and September, 1957, at a rate of almost five times a year, according to data gathered through household interviews by the U. S. National Health Survey.

The report, entitled "Preliminary Report on Volume of Physician Visits, United States, July-September 1957," is the first of a continuing series. Special weekly reports on the incidence of upper respiratory diseases have been issued by the Public Health Service for some time.

Future reports in the series will deal with disability, hospitalization, injuries, chronic illnesses and related health matters.

The report on physician visits points out that the interviews occurred at a time of year when people are normally least likely to call the doctor. The report notes that last year, however, respiratory diseases were probably at above-average levels.

Nine out of 10 of the physician visits were in the physicians' offices, the report shows.

GLAUCOMA

Glaucoma . . . a leading cause of blindness after age 40 . . . is an insidious disease afflicting over 1 million Americans.

Cholst, Goodstein, Berens and Cinotti (Department of Research, New York Eye and Ear In-

firmary) report in the J.A.M.A., March 15, 1958, a study of drugs and their effect upon the normal eye and in patients known to have glaucoma.

Glaucoma, characterized by increased ocular fluid tension, is often precipitated when drugs are given which dilate the pupil. Belladonna and atropine are drugs used for gastrointestinal antispasmodic action which dangerously increase ocular fluid pressure. They cause dilatation of the pupil, and this mechanically obstructs free-flow of fluid through the small diameter passage which normally maintains correct pressure.

WOMAN'S AUXILIARY TO THE LOUISIANA STATE MEDICAL SOCIETY

ORLEANS PARISH

The Woman's Auxiliary to the Orleans Parish Medical Society entertained the members and their guests with a program tea on Wednesday afternoon, April 9th, at the Orleans Club.

Receiving in the drawing room with the president, Mrs. Eugene H. Countiss, were Mmes. David Bradley, Philip P. LaBruyere, W. Robyn Hardy, Jr., and Branch J. Aymond.

Mrs. Charles Farris, Jr., was chairman of the program which featured Mr. Nash Roberts, "Reports on the Weather".

As an added feature Mrs. Nicholas Chetta, essay contest chairman, and Mrs. Philip Johnson, co-chairman, introduced the four high school student winners in the essay contest on "The Advantages of Private Medical Care" or "The Advantages of the American Free Enterprise." First place winner Bonnie Sue Harris of Mt. Carmel Academy; second place, Glenn Gatipon, Jesuit High; third place, Marilyn Reilly, Fortier; fourth place, Albert Derbes, Jesuit High. The four winners, their parents and teachers were guests of honor at the tea.

Alternating in presiding at the tea and coffee services were Mmes. C. Barrett Kennedy, Martin O. Miller, Rufus H. Alldredge and George D. Feldner.

Hostesses assisting in the dining room were Mmes. Fred O. Brumfield, Edwin L. Zander, Joseph O. Weilbacher, Jr., Samuel Zurik, C. G. Wichser, Jack K. Wickstrom, Willard R. Wirth, Arthur J. White, Robert M. Willoughby, Harry Zoller, Guy Williams, Charles J. Wheeler, Joseph W. Wells, Morris J. Weisler, George E. Welch, and Bernard B. Weinstein.

"Doctors' Day," March 30th (Sunday), was beautifully celebrated. Mrs. George F. Sustendal was Chairman for Woman's Auxiliary to the Orleans Parish Medical Society.

Mayor Morrison issued a proclamation to honor the Doctors on March 30th.

The New Orleans newspapers had news articles pertaining to the observation of the day.

The clergy of the churches had prayers recited for the doctors.

The Woman's Auxiliary to the Orleans Parish Medical Society had red carnations and posters placed in the lobbies of the 15 hospitals throughout the city in honor of all our doctors.

Mrs. Branch J. Aymond,
Publicity Chairman.

BOOK REVIEWS

Collected Papers of the Mayo Clinic and Mayo Foundation; v.47 (1955), Philadelphia, W. B. Saunders Co., 1956, Illus., pp. 794. Price $12.50.

The latest edition of this valuable and well-known annual publication is a welcome addition to any physician's library. The articles chosen for inclusion have been selected primarily with the interests of the general practitioner, general surgeon, and the diagnostician in mind, with certain representative articles in the field of the specialties and basic sciences. The volume is made up of 734 papers of which 56 appear in full, 53 by abridgement, 28 by abstract and 597 by title only. Material is grouped by subject in the following categories: (1) Surgery of the Heart and Blood Vessels with Special reference to the Extracorporeal Bypass Pump-Oxygenator; (2) Blood and Circulating Organs; (3) Alimentary Tract; (4) Genito-urinary Diseases; (5) Ductless Glands; (6) Dermatology; (7) Head, Trunk and Extremities; (8) Thorax; (9) Brain, Spinal Cord and Nerves; (10) Radiology; (11) Physical Medicine and Rehabilitation; (12) Anesthesia, Gas and Intravenous Therapy; (13) Miscellaneous.

MARY LOUISE MARSHALL

PUBLICATIONS RECEIVED

Doubleday & Company, Inc., N. Y.: You Can Increase Your Heart-Power, by Peter J. Steincrohn, M. D.

Grune & Stratton, Inc., N. Y.: Physical Dynamics of Character Structure; Bodily Form and Movement in Analytic Therapy, by Alexander Lowen, M. D.; The Medical Management of Cancer, by Henry D. Diamond, M. D.

Philosophical Library, N. Y.: The Atomic Age and Our Biological Future, by H. V. Brondsted, translated by E. M. Huggard; Fat Consumption and Coronary Disease: The Evolutionary Answer to This Problem, by T. L. Cleave, M.R.C.P.; Our Nuclear Adventure, its Possibilities and Perils, by D. G. Arnott.

The Williams & Wilkins Co., Baltimore: A Guide to Human Parasitology for Medical Practitioners (6th edit.), revised by T. H. Davey, M. D.